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Selling Machinery in Europe Since the Armistice

Conditions in the Devastated Countries—European Trade Customs—The Shortcomings of American Business Methods—Points on How to Develop Foreign Business

By OLIVER FIELD ALLEN

IT HAS been two years since the Armistice was signed, a great amount of reconstruction is actually completed, and yet American machinery manufacturers have supplied comparatively little factory or contractor's equipment to Europe. America has been told of the awful destruction; of thousands of industrial plants completely demolished; of whole towns and cities in ruins; and of the scarcity of all kinds of tools and supplies. And it was all true. Even the armies ran short. Neither the British nor the American Army engineer services had anything like the amount of tools they wanted in the fall of 1918, to say nothing of the limitations imposed on civilian establishments. Private plants not actually engaged in necessary production for military needs were either taken over by some army service or wrecked and the tools used in an army shop. At the same time there were thousands of tons of the best American machine tools and supplies lying about our American docks and seaboard warehouses, waiting for ship capacity to take them over. The Belgians were wise enough to buy, through Government agencies, a considerable part of these stocks, and use them advantageously to get their shops going quickly.

When the fighting ended the American manufacturer naturally thought he could combine a patriotic duty to help in world reconstruction with the quick and profitable sale of machinery available because war production had stopped in the United States. He knew that large quantities of American tools had been used by the allies, both in civilian plants, and in French, English and American army work. So he felt that they needed no introduction. He did not know how many of the tools, and what large quantities of supplies, used in even the American army engineer shops, were of French and British manufacture. Nor, perhaps, did he appreciate the quantity of fine tools released in Europe from war production.

As soon as he could get the necessary passport, the owner, president, or some other important man, went from many establishments to France not later than the middle of 1919. Sometimes he took engineers or other assistants with him. If he represented a company or group which had long established and going connections over there before the war, and could "carry on" with old, affiliated interests, he was fortunate but still had his troubles. We are here more interested in those trying to establish profitable connections for export business, where they have not existed before. These American business men were most cordially and courteously welcomed, but most of them did not get any orders. It is perhaps no exaggeration to say that for the great majority the total selling price of all business resulting directly from those visits was less than the traveling expenses for the trip. And that is no disparagement

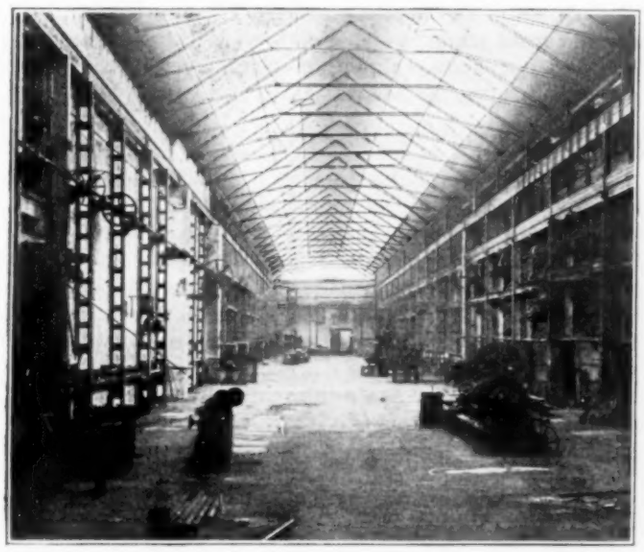

FIG. 1. MAIN MACHINE SHOP OF THE SOCIETE D'ELECTRICITE ET DE MECANIQUE AT GHENT, BELGIUM

This illustration shows it in the condition in which it was left by the Germans at the time of the armistice. This plant was used as a German artillery repair shop during the war and was consequently not demolished, but practically all of its machinery was taken away.

FIG. 2. THE SAME PLANT AS SHOWN IN FIG. 1

The photograph was taken on the first of April, 1920, and shows complete restoration of tool equipment. This plant recovered a large part of its stolen machinery and also shares in the American machinery purchased through government agencies referred to in the text.

FIG. 3. LESQUIN MACHINE SHOP OF THE CIE. FRANCAISE THOMSON HOUSTON NEAR LILLE

This shop was not quite completed in 1914 when invaded by the Germans. Note the very effective lighting and use of motor driven tools representing the best French engineering at the beginning of the war.

of the men who went over; they were among the very best men in their own lines at home, thoroughly successful American business men, who worked conscientiously and continuously while in Europe. Unfortunately, they were playing at a game where the handicaps against them were very heavy and where they did not have the right outfit to play with. It was something like playing golf with a tennis racquet or baseball with a golf stick and tennis balls. All good enough in their own places, but not successful in such a combination no matter how skilled the player.

Language a Handicap

Perhaps the most apparent handicap is language. Very few Americans speak French, Italian, Spanish, Flemish or German at all. Still fewer know their idiomatic engineering and technical terms. We had our troubles on that score in the army. Theoretically an interpreter is easy to get and solves the problem of both interviews and correspondence. Actually many of us in the engineers gave them up long before the armistice. It is unfair to expect the average, even well-educated man to really know two languages as to the technical details of several lines of trade. If he does he has a better job than acting as interpreter. And when he does not know he does some funny things. One passed on a request for me for a pumping unit and translated the French expression which clearly means a centrifugal pump as a piston pump. If he has been educated in English, or working for an English concern he cannot get out of the habit of treating our gallons, when talking of capacities, as being the same as the British imperial gallon, which is much larger, and the ton as the British ton, which is even a little bigger than the metric.

I have, more than once, listened in at a conference between two well informed men in the same line of work, each of whom would most carefully explain his own side of the question in his own language, and wait in awed silence, while the interpreter translated, amazed that it was possible to express it all in so few words in the other language, both in blissful ignorance that the translator with his own limited knowledge of the subject and the foreign language was only "hitting the high spots." Both sides ended with a dissatisfied feeling which they could not understand. And yet the interpreter was doing his best all the time. There was a case where it was appropriate for me to "butt in" and clear the air. Having finished my few words of explanation we looked for the interpreter only to find that he had quietly sneaked out. The joke was on me, for I had to finish the job. In another case a very complete list of machinery was prepared and checked. The purchaser came to me and asked where a certain lot of supplies was. I happened to know about the transaction and that there was nothing of the sort included. I called for the list. The purchaser pointed to the item, properly spelled and very plain, but actually covering something with a quite different trade name. Fortunately the things supplied were of more value than the name given them implied and so the matter was easily adjusted.

Confusion of Measuring Standards

Due to the different systems and standards of measurements employed in various parts of the world, the manufacturer who sends descriptive matter abroad including engineering data expressed only in our usual American terms, is frequently handicapped by the foreigner's equally general use of entirely different units. This includes not only such units as those of dimensions, weights, screws and pipe threads, but the ways of defining such things as pressure, vacuum, torque and temperature involved in giving ratings and operating conditions.

FIG. 4. VIEW OF THE SAME BUILDING AS SHOWN IN FIG. 3

This illustration shows the plant in the condition in which it was found upon the retirement of the Germans in the fall of 1918. A large part of the machinery and structural steel had been taken to Germany. The plant has been rebuilt with improvements and is now again in operation.

Another handicap is trade customs, perhaps better expressed as "shop practice." While our machine shops, rolling mills, etc., differ from each other in details of their ways of doing things, the migration of mechanics, foremen, superintendents and engineers, coupled with the interchange of information through our technical papers, such as the *American Machinist*, and the meetings and publications of our engineering societies, has been sufficient to establish certain pretty well defined ways of doing many things all over the country, and has resulted in the development of machine tools, hand tools, standards for stock, dimensions, etc., which are quite unique to the United States. The same thing has happened in Europe, and as the developments have not been along exactly the same lines, many things normal to American shop requirements and very efficient here do not fit European conditions.

To illustrate: In Western Europe, thin, smooth iron castings are used for a great many things, from water closet flushing tanks to electric switch boxes for which we use sheet metal, entailing very different machines for the manufacturing processes. Parts that we would mold they machine out of the solid or vice versa. They will sometimes spend more labor and care in the foundry, such as making more accurate and stable cores and doing loam molding, thereby getting castings requiring very light finishing cuts, where we allow greater tolerances in the foundry and take much heavier cuts in machining. A Belgian rolling mill will produce rails, a great variety of structural shapes, plates, etc., each large mill meeting the requirements for nearly all steel products which a rolling mill can furnish, while our mills specialize on a limited group, as rails, or structural shapes, or plates, etc. Belgian mills are designed and equipped to do all of them well and cheaply. The limited market and necessity of competition have brought about this condition.

The official of the American manufacturing establishment who went over was a business man in the habit of having the reputation of his goods and the purchaser's general knowledge of them help greatly to sell them. In America we are prone to let purchasing agents buy on reputation, price and time of shipment without as close a study of the details of design, construction, durability, etc., as is frequently made in Europe. This same official was perhaps the man who originally developed the machines he offered, or he grew up with the business; but generally he has been too busy with the administrative or financial affairs of his company in recent years to follow in detail all of the changes in design, and to know why his machine is now made just as it is.

FIG. 5. HOMES OF THE SUPERINTENDENTS AND ENGINEERS

They are shown as they existed at the time of the invasion. This shows the attractive conditions under which employees of the European industrial establishments frequently live. These buildings as well as the plant shown in Fig. 3, were destroyed.

FIG. 6. ANOR FORGE SHOPS, FRANCE

This view shows a solid wall, typical pre-war arrangement.

The European engineer is a highly educated, well-trained man. Sometimes, from our point of view, the theoretical part of his education over-shadows the practical, but no one who knows him in the aggregate can question the thoroughness and soundness of his training. The result is, he asks very pointed questions. No important job can be closed without going through an engineer's hands and if he finds the foreign seller's representative cannot answer concrete, pertinent questions about details of the particular machine he is going to buy, he loses interest at once. I think those manufacturers who are selling the most in western Europe will agree that (war purchases being now eliminated) you cannot sell there on bluff, on reputation gained in another country, or even on low prices and prompt shipments, unless you can convince the purchaser that your machine is really suited to his requirements and will operate economically with low upkeep during a long life.

Intelligent Salesmanship

Does the American, wishing to develop his foreign business, ever think how much chance a foreigner would have to come into his office and sell a tool such as he usually buys from some old friend, no matter how good it might be? What would his own superintendent say to specifications in French, dimensions in millimeters, international screw threads, chucks which would not fit his drills and spare parts to come from Europe? And how seriously would his purchasing agent consider the offer of a foreign salesman, who brought an interpreter with him, who could only point to machines in use in another country and who did not know the requirements of the American shop?

If the personal representative of the American manufacturer is thus handicapped by lack of accurate, detailed information when he goes personally to see the foreign purchaser, how much more so is he if he is trying to sell by mail or through some general agent.

Several cases, some of them involving very large orders, have come to my attention where a foreign proposal was received by mail, or through a commission house, showing so plainly that the man who prepared it did not understand the conditions that it was read once, politely acknowledged, but never seriously considered.

For certain classes of merchandise the commission export and import house is an economically sound intermediary between the American producer and the foreign user; but except in those rare cases where it has developed a highly trained technical staff and become virtually the export department of the American factory, it not only is unable to present the product intelligently, but adds another item of expense to the already high-priced American goods. Dealing through such an agency also involves additional delay and chances for errors by forcing everything to pass through another set of people.

Negligence and Dishonesty

The last handicap I will discuss (for I wish only to emphasize important typical features) is one I dislike to have to mention, but refer to it because I feel that

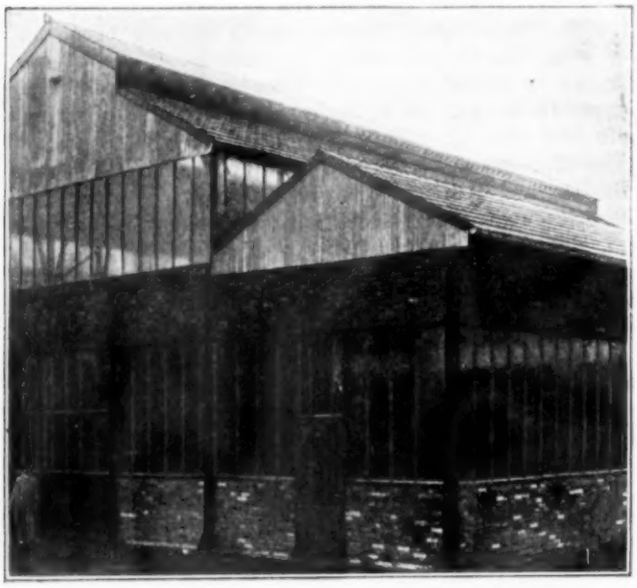

FIG. 7. THE SAME BUILDING SHOWN IN FIG. 6.
As reconstructed in April, 1920. Attention is called to the increased size and the great improvement in the window arrangement.

it is the duty of every American, and especially of American manufacturers, to show in no uncertain terms the most positive denunciation of carelessness and dishonesty in filling foreign orders. Carelessness shows itself in incomplete study of requirements, "sloppy" manufacture, defective packing, incomplete tagging and marking, not only of boxes but of parts to be reassembled abroad; in failure to include adequate drawings and instructions for setting up, starting and operating. Of what use is a machine, no matter how fine it is, if after a two thousand mile voyage some important part is found broken, ruined by exposure, or missing? The percentages of such troubles with the shipments from those American factories doing the most export trade are bad enough—the others are awful.

Worse than negligence is dishonesty. A member of the A. E. F., after demobilization, took the agency for a certain American product. Through his personal acquaintance made in the trenches, he sold several cases. When the cases arrived and were opened the top layers were per contract and samples but the majority of the contents were very inferior. An engineer for a large French manufacturer came to the United States after the armistice. He got samples of a certain product and took them home. They were tested and found suitable. A good sized order was placed. When the goods arrived they were not anywhere near equal to the samples.

Exchange Rates and Labor Cost

The handicaps I have mentioned are among those which always exist, irrespective of fluctuations of exchange, adverse effects of import duties or differences in cost of labor. The questions of rates of exchange and relative value of money as related to both wages and cost of living in America and in Europe are economic questions outside of the scope of this article. It may be pointed out, however, that much of the raw material entering into the construction of machinery, such as iron and copper, has to be largely imported into Frence, Belgium and other European countries, and our competition in their markets is after all largely a question of the comparative cost of the necessary labor and general expense involved in production and merchandising, after the American and the foreign products have been put on an equal footing as being suitable to the purchaser's requirements. The meeting of requirements comparable not only with the local products but with those of other foreign countries which can compete in the same territory is essential.

We must not hide excessive costs nor high overhead behind a camouflage screen of adverse exchange conditions or peculiar foreign specifications. The advantages are not all on the other side. For instance, good steam coal now costs about 300 francs a ton in France which is equal to about $20 at present rates of exchange. It is plain that power used to produce machinery costs more there than here. Many food supplies cost more there now, even when purchased with money bought with American dollars. To the native, the cost of living in western Europe has increased far more than it has here, and yet they are beginning to undersell us in neutral markets, in spite of the fact that we usually produce in greater quantities from more standardized designs.

Why? For one thing, they are working harder and far more hours per day. We have our vacations but we want an amount of time for play all the time which seems excessive in Europe. The fifty weeks in the year when we are supposed to work, we demand daylight time enough before or after work to keep our automobiles in order. The difference was emphasized while we were soldiers. We Americans played, or went sight-seeing, for all the leave time we could pry out of that orderly room dictator, the "Top Sergeant." No so the "poilu." He spent the first day or two of his "permission" resting and visiting, then worked hard for ten days, usually at his old job. Another day or two of play, his two weeks were up, and back he went to fight. That custom was so universal that in at least one sector some American engineer shops recruited most of their men employees in the summer and fall of 1918 from French soldiers on leave. The only stipulation, beyond paying the official published rates of wages, was to pay cash whenever the soldier decided his working leave time was over so that he could personally hand the money to his family before he started back to the front. In peace times the gardens,

the rabbits, the chickens, etc., which reduce expenditures for sustenance, to say nothing of odd jobs which either actually bring in money or at least reduce expenses, occupy much of the time outside of working hours. I recently made several automobile trips through the devastated regions, in the much-fought-over areas both east and north of Paris. Schedules were such that we frequently started early and stopped late. I found the French men and women hard at work in towns and on farms before seven in the morning and coming back from work at seven in the evening. They were actually working, by the thousands, eleven or twelve hours per day. Even in Paris factories on an eight-hour basis are frequently working ten hours a day.

(To be concluded next week)

Empty Shops and Crowded Homes

By Entropy

During the war almost every shop that could get hold of a profitable order felt the patriotic urge to build additions and enlarge so as to gather in all the profits that could be had. In other words, to "Make hay while the sun shone." Then after the war there were many who felt so reluctant at parting with their profits and not knowing that stock dividends would be passed as non-taxable, put up still more buildings. The result is that the country as a whole has a greatly increased potentiality for manufacturing.

One of the most exasperating predicaments for a firm to be in is to be "real-estate poor." That is, to have more real estate than it can afford, and to see regular sure-enough profits dissipated in paying taxes, interest and insurance.

In the natural course of events the shop that is in this condition finds that the best thing to do is to sell enough goods to keep the factory filled with workers, even though a small profit, or even no profit at all is made. When a shop is so affected and cuts prices to get orders there is apt to be some upsetting of the business of all its competitors. They can either meet the cut or they can wait until the cut-price shop has accepted all the orders it can absorb and then go after the rest of the business at the old prices. But when, as now, nearly every shop needs work we have a new condition, and one that is giving a great deal of concern to many people. In one instance a very well-known concern which expanded, not merely because it saw a profit but because the government begged it to do so, the problem has been attacked by endeavoring to merchandise its own goods directly to the user, and its shops vacated by the war machinery are being turned to the manufacture of goods related, in use at least, to the standard line of the company but of greater real need. Its regular line is almost entirely in the class of luxuries. Its new side lines, while partly in the luxury class, are mingled with household necessities.

It seems rather as if for some time to come we are apt to have a very poor market for luxuries and overpriced necessities. The buying public gives every evidence of being either broke or satiated. Or it may merely have sensed a failing market, and no good sport no matter how much he would like to throw away his money, likes to buy on a falling market. On the other hand, there is a great shortage of necessities of the kind that normally carry only a limited profit. Therefore it seems as though the best bet for some years would lie in the staples. It seems almost inevitable that the luxuries already bought by our people in their flush moments will be squeezed out into the market as second-hand goods, with scarcely a mark of usage on them.

Machine Tools Not Luxuries

On the other hand, there are things which are not luxuries, and yet under present conditions not necessities. Among these and of special interest to us just now are machine tools. There must be at least double the floor space available for their manufacture that there was six years ago. Machine tools cannot be forced on a market. Cutting prices does not add to the demand at all. Price cutting by a single shop may shift the flow of orders slightly but it cannot affect the total orders. No one buys lathes to store away against an expected demand unless for a very few months only. The demand cannot be stimulated except by stimulating all business. The manufacturer is as helpless as old King Canute when he tried to sweep back the tide. All he can do is sit and wait for business to come in; then he has to fight to get his share of it. But when there is none to share his efforts are not likely to be crowned with success.

However, a machine-tool shop is after all only a machine shop, and machinists are usually adaptable people. Does it not seem reasonable for machine-tool shops to have other lines, possibly less profitable in rush periods but such as will carry the organization through lean days without a net loss? Of course, it is difficult to find another line which will need exactly the same proportion of the different machines which constitute the equipment of any given shop. It was easy for a great number of shops to change over to the manufacture of munitions during the war, if there was a profit in sight, and it ought not to be more difficult for shops to change over to avoid a loss. There is another thing to be considered, and that is the desirability of keeping an organization intact so that business may be carried on profitably when another rush sets in. Men in machine-tool shops are not of the type that one pulls up by the roots without danger of their not growing again in the same place. They are not in the habit of going away for a time and coming back to the old shop. Their pride is too great, and when occasionally one does come back he is apt to find so many strange faces that he soon gets homesick and drops out to stay.

Helping the Housing Situation

The fact that shops are laying off men is sure to help the housing situation. This may seem paradoxical, but when money becomes scarce a great many small families are sure to "double up"; that is daughter and her new husband go to live with her folks, or married sisters get their husbands to take a flat together; single men who have afforded rooms by themselves will bunk in together and share the rent, and so on. To some extent this has already been forced on salaried men by the high cost of living and the low percentage of increase in salaries, but wage earners have greatly expanded in their demands for space as compared with pre-war periods. This may not be without its compensations for the rest of us, for if the demand for housing lets up it will not only give more time in which to meet the demand but it may reduce the cost of building by not creating additional competition for materials and labor.

MODERN PRODUCTION METHODS

By
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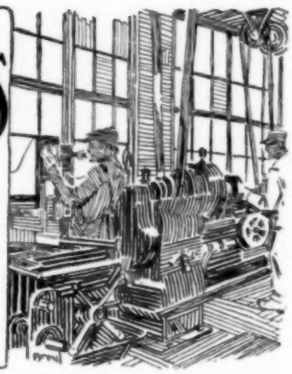


XV. Accounting for Supplies

How the Cost of Non-Productive Materials Gets Into the Final Cost of the Product—Correct and Incorrect Pricing Methods

THE only element of overhead expense which remains for us to treat is the non-productive material or supplies. As stated in a former article, non-productive materials are those which contribute to the manufacture of the product, but which cannot be allocated as a direct charge to a given unit of the product because they are not directly apparent in the finished goods.

Admittedly, materials which do appear in the finished product are sometimes treated as supplies because the cost accountant is not sufficiently analytical to devise an accurate method of measuring the amount that goes into each item of product. Occasionally, however, it is most practical to charge such items into overhead expense and so avoid the clerical effort which would be required to allocate them properly to their final resting place as productive material. If the error be not great, the clerical expense caused by insistence upon exact figures may easily be out of proportion to the benefit which is achieved. However, the capable cost man will continually strive to get as much as possible of the non-productive labor and of the non-productive material charged to the product as direct items.

At first glance it seems that material, whether productive or non-productive, is exceedingly easy to account for. As a matter of fact it is, provided that, first, accuracy of reporting the use of materials is observed, and second, that they are charged into the costs at a correct price. In the third article of this series, on "the need for systematic stock-keeping," we discussed the physical arrangement of stockrooms and the system of issuing stock. In that article, we were considering it principally from the standpoint of production planning, but the method outlined had also in mind the need for accounting for stock from a cost point of view.

I know that some executives allow the slackest of storekeeping methods because they, rightly enough, have a horror of the kind of red tape that some accountants recommend. To some accountants, absolute accuracy is a religion. They set up as a goal the records rather than the commercial use of the cost system. Therefore, when I say later on in this article that materials are to be issued on requisition I assume that good judgment will be used.

Some supplies are so inexpensive that extensive routine in issuing and accounting for them is not worth while. In machine shops I consider it a silly waste of effort to expect machinists to requisition a handful of waste; and yet I have seen it done. The sane thing is for the foreman to requisition a several days supply for his department and place it where workmen can help themselves. If it is wasted the departmental analysis of expense will soon enough show up the increased usage and steps can be taken to bring the conditions back to normal. The stock kept in the plant is often called "current" stock and that in the stockroom, the "reserve" stock.

Rivets are another common material which it is better to issue to the shop in keg lots rather than to demand a requisition for 10 or 15 at a time.

Large castings and items like plate steel can be charged into the product from the specification sheets. Actually, of course, such items are seldom kept in a stockroom under lock and key but are stored in some space handy to the department where they will be processed. When an engine or boiler is finished it is

STORES INVENTORY CARD.
THE MEEKIN CAN CO

ARTICLE LOCATION B5B

ORDERS			RECEIPTS					WITHDRAWALS					BALANCE		
DATE	ORDER NO.	QUANTITY	DATE	PURCHASE ORDER NO.	QUANTITY	PRICE	AMOUNT	DATE	REQUISITION NO.	QUANTITY	PRICE	AMOUNT	DATE	QUANTITY	AMOUNT

FIG. 70. STORES INVENTORY CARD

apparent that a certain quantity of these heavy materials must have been used. Every month or so a physical inventory of those classes of stock may be taken as a check on the usage.

Stores Inventory Card

The first record needed in the routine of gathering the cost of supplies is the stores inventories card, Fig. 70, which is kept in the cost department. This differs from the record kept by the production department, in that it maintains a record not only of the quantity of the supply on hand, but also gives the price paid for it. The entries in the first division, headed "Orders" are actuated by the copy of the purchase order which is sent by the purchasing department to the cost department. The source of entry for the division headed "Receipts" is the receiving slip and invoice. It is of course necessary that the receiving slips and invoices first be reconciled to agree as to quantity before the entry on the inventory card is made. Under the division headed "Withdrawals," a record is kept of the supply requisitions which have been filled. "Balance" is self-explanatory.

It is apparent that the inventory records which are maintained by the cost department merely give the detail of the controlling ledger accounts. Each individual stores inventory card bears the same relation to its ledger account that the individual account of any debtor to the company bears to the accounts receivable account in the general ledger. In other words, the various inventory accounts of the main ledger are the controlling accounts of the cost department's detailed inventory.

While it is not my purpose in this article to discuss the accounting for the direct or productive material, it may be well to note that Fig. 70 is suitable for that purpose. Fig. 71 is a variation which is used in keeping a record of finished parts. While it will not be discussed until later, it seems well to show this form at this time, inasmuch as its purpose is much the same as that of Fig. 70.

Account No. 60
Stock and Cost Record

Part No. _____

Part Name _____ Material _____

No.	Orders	Quantity	Total Cost	Unit Cost					Quantities Used					
				Mat'l	Labor	O. H.	Total	Extras	Month and Order No.	No. of Pieces	Balance Available	Month and Order No.	No. of Pieces	Balance Available

FIG. 71. FINISHED PARTS INVENTORY CARD

The requisition not only gives authority to the stock man to make the issue, but it also serves as a record which will show for what purpose the supplies or materials were used. The requisition is comparable to a bank check, made payable in materials rather than in money. It shows, as does the check, the authorization for the payment and to what department the payment is made, and like the modern voucher check, it also shows for what purpose it is made.

The expense requisition form is shown as Fig. 72. In order that it may readily be distinguished from the requisition for productive materials, we have found it well to have in the upper left-hand corner a large letter *E*, standing for "expense." A glance at the requisition will show that it supplies space for filling in the order number and the expense designation—by which is meant the class of expense, such as repairs to material, repairs to equipment, repairs to tools, material supplies and so on. In the space headed "charge account number," the correct ledger account is entered. This is necessary because sometimes expense materials may be withdrawn from stores and instead of being charged to expense will be charged to some asset account. It may even be diverted for use in the finished product itself and so become productive material. On the requisition, there is also a place to make a charge to the department which receives

E EXPENSE REQUISITION COST COPY — DATE

ORDER NO.	EXPENSE DESIGNATION	CHARGE ACCT. NO.	CHARGE DEPT.

QUAN.	DESCRIPTION	PRICE	AMOUNT

DELIVER TO DEPT. _____ SIGNED BY _____

FIG. 72. EXPENSE REQUISITION

EXPENSE REQUISITION DISTRIBUTION

Department / Item	Boiler	Power	Office	Tool Room	Gen. Factory	Automatic	Milling	Lathe	Planer	Polishing	Hardening	Annealing	Shipping	Selling	Total
Belting						50.90	38.70	25.10	67.45	18.00		10.00			210.15
Mach. Repairs				32.24		205.10	95.30	5.25	12.11						394.00
Bldg. Repairs					5.27										5.27
Supplies Misc.	19.25	15.12		35.40	57.15	37.12	34.15	19.12	10.20						235.54
Repairs to Tools				25.30		20.10						29.85			75.25
Small Tools				63.20	7.20	50.80	19.20	30.20	40.90			31.90			265.00
Repairs to Equipt.	5.00		7.50		22.50										35.00
Hardening Materials											124.65				124.65
Abrasives										65.90					65.90
TOTAL	24.25	15.12	7.50	161.14	140.12	363.62	185.55	145.67	130.45	83.90	124.65	71.75			1456.79

FIG. 73. EXPENSE REQUISITION DISTRIBUTION

DAILY DISTRIBUTION OF REQUISITIONS

CHARGE							CREDIT							
Total	Machinery	Buildings	Goods Finished & In Process	Selling Expense	Manufacturing Expense	Date Month Jan.	Castings & Forgings	Bar Stock	Iron & Steel	Hardening & Carbonizing	Lumber & Packing Mat'ls	Material Purchased Finished	General Stores	Total
337093	4000	2500	310093		10500	1	157583	10011	69700	500	5000		5000	337093
						2								
10317			15267		3700	3	3917		4215	500	3000	1700	3200	10317
9625			9200	525	4000	4		9200					4525	9625
28972			28972		2818	5	9782	12000	6911	500			1500	28972
16282			15062		6750	6	5250	6500	19000	500	4000	2000	3810	16282
24530		250	23821	250	4980	7	11782	5475	4800		1000	1000	9700	24570
22276			21986	500	7310	8	8925	4925	8374				5510	22276
						9								
14864			14205		6510	10	6933	3798		500	5000	3000	7123	14064
25580		1750	23830		4900	11	12420	5320	4250	250	4000	1110	4700	25050
22239			21736		4700	12	1983	2801		750			3800	22235
22870			22497		5850	13	11801	3420	6891	500	1200	1050	4800	23702
18724	3375		14706		5100	14	7920	4830	5810	450		9300	5100	18724
16832			16612		2200	15	3020	3900	7220		5000		2000	16832
						16								
12340			11902		4120	17	2200	5800	5210	500	1000	5010	4120	12340
18035	1029		17226		6025	18	11232	4750	12283	500		2000	6100	18035
8524			8314		2100	19	9512	6730	1100	100	4100		2100	18524
12827		270	11726		3330	20	3210	2821	4920				6800	12827
11940			11340		5100	21	8420	3300	2920		2250		5100	11940
21626			21426		2000	22	9815	4220	6620		3100		2000	21626
						23								
25291	815		24579		11318	24	11802	4250	6230	7500	1000	1050	12200	25291
1992			1942		5080	25	8302	7450	3560				5080	19922
14049		396	13478		5575	26	9100	15020	2870				6100	14049
11983			11563	750	3500	27	5201	2870	3201	4200			3950	11983
5990			5837		4175	28	4700	6250	2200				4175	15990
13715			12965		7500	29	4859	3820	4291				7500	13715
						30								
20242			19842		12800	31	3541	4102	1520				11200	20242
483620	4029	2180	467650	2025	145679	Total	217836	158644	100609	12465	38650	13483	12998	483620

BASIS FOR JOURNAL ENTRY

Debit \ Credit	Castings & Forgings	Bar Stock	Iron & Steel	Hardening & Carbonizing	Lumber & Packing Mat'ls	Material Purchased Finished	General Stores	Total
Manufacturing Expense				12465	32180		9679	145679
Selling Expense					1825		1805	20250
Work, Tools & Repairs	74781	13613	9885		750	13483	13586	467650
Buildings		3501	1350					21851
Machinery		21516					19328	40844
Total	217836	158644	100609	12465	38650	13483	12998	483620

FIG. 74. DAILY DISTRIBUTION OF REQUISITIONS

the material. The lower part of the requisition is given up to space in which to describe the material, the quantity issued, price and so on. It is well to have a definite understanding as to who in the plant is authorized to sign expense requisitions in order to prevent waste.

Requisitions and the Cost Department

After the storekeeper has issued the material called for, the requisition is sent to the cost department, where it is priced and extended. A clerk in the cost department enters on the inventory card, under the head of "withdrawals," the quantity, price and amount. The requisitions are then sorted first by departments and then by expense designation. At the end of the month, the requisitions under each classification are added, thus giving the figure which shows the amount of expense incurred for supplies against each of the classifications of expense which we desire to maintain on our expense analysis.

Requisitions for productive materials are handled in exactly the same way, except that instead of sorting them in the cost department by departments, they are sorted out to the different accounts and then subdivided into the accounts which are to be credited.

Thus we might have a productive requisition for material withdrawn from the forgings inventory. What we desire is, of course, to obtain the credit to the forgings inventory at the end of the mouth and a corresponding charge. So by sorting the requisitions to the accounts which are to be charged with the material, and then sub-dividing them to the accounts which are to be credited, we can, at the end of the month, by adding up the requisitions, arrive at the amounts which we must have.

In order to analyze the use of expense materials so that we may get the proper items into the expense analysis, we use the form shown in Fig. 73, "the expense requisition distribution." This sheet totals the requisitions for supplies which have been used for the month and shows in which department and for what purpose they were used.

The form shown in Fig. 74, "the daily distribution of requisitions" is filled in daily for a month. In a very small shop, four or five times a month will suffice. It is an analysis of all requisitions, both for direct and indirect materials. It is solely a mechanical means by which the charges for material of all kinds and from all storerooms are gotten into their final resting place. If indirect material was always used for non-

productive purposes, and if materials ordinarily purchased for use as direct materials were never diverted to use as non-productive material, we would be able to get our analysis from Fig 73. As we have seen in former articles, however, this is not always true. It is therefore necessary to have such a distribution as that shown on Fig. 74. You will note that this form is divided vertically into approximately even sections by the date column. To the right are the various accounts which have been credited by having materials withdrawn from them. To the left of the date column are the accounts which should be charged with those amounts. These columns are totaled and in the lower right-hand corner they are condensed so as to show the journal entries to the ledger accounts which are necessary. By means of this sheet, we get the correct debits and credits to the various ledger accounts for all material used, both direct and indirect. This form, Fig. 74, does for materials what Fig. 67 does for labor. Fig. 75 shows how the ledger accounts look after the entries shown on Fig. 74 have been made to them. We have simply added to the ledger accounts, as they appeared at the end of the last article, the figures which we developed in this one.

Price Considerations

I have seen many methods used for pricing materials and it is my experience that this is one of the points which to many men present unnecessary complications. Of course, if material markets were completely stable and materials cost the same year in and year out, there would be no difficulty involved. But as business men know to their sorrow, there is no stability in material prices.

Confusion in cost accounting frequently comes when an executive tries to solve the problem of how he shall charge to the finished product a material which has been purchased at many different price levels. The difficulty seems to be that the average executive confuses cost accounting and estimating.

If a man has in his storeroom 30 tons of bar stock, 10 tons of which cost him $60 a ton, 10 tons which cost $80 a ton and 10 tons which cost $100 a ton, it is entirely proper for him in figuring his selling price to get the profit which would come from considering that the stock used in his product had cost him the higher price, provided, of course, that he is able to make the sale on that basis. To reverse the condition, he is generally driven in a declining market to set a price based on the present material costs; which would mean in the case of the man just mentioned, that he would have to figure that the material in his product cost him $60 instead of the $100 which it may actually have cost him. Not that he would do this willingly, but competition generally forces him to it.

However, estimating for the sake of making a bid, or figuring a selling price, has nothing to do with costs. If, on the rising market the material used was

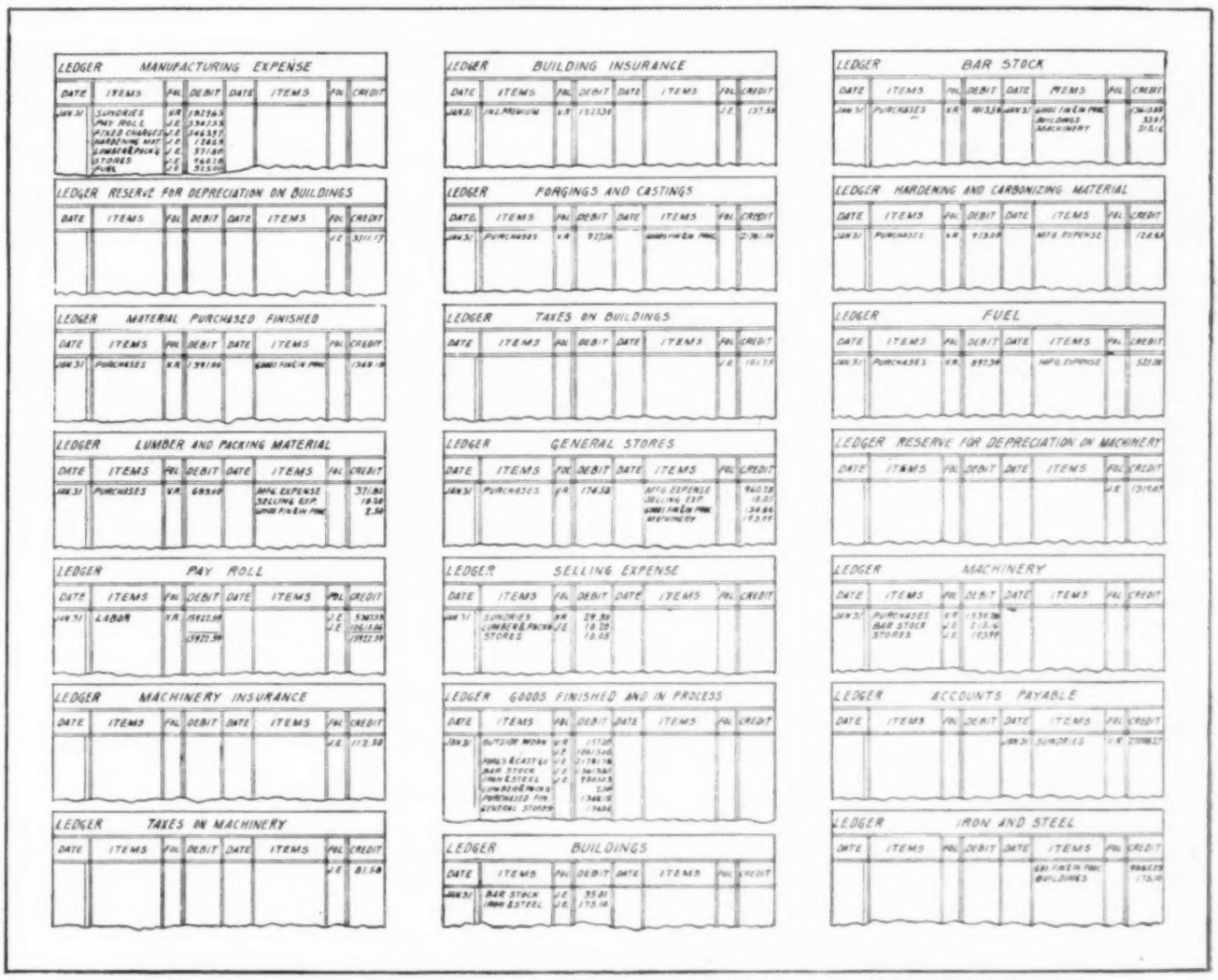


FIG. 75. APPEARANCE OF LEDGER ACCOUNTS AFTER ENTRIES IN FIG. 74 HAVE BEEN MADE

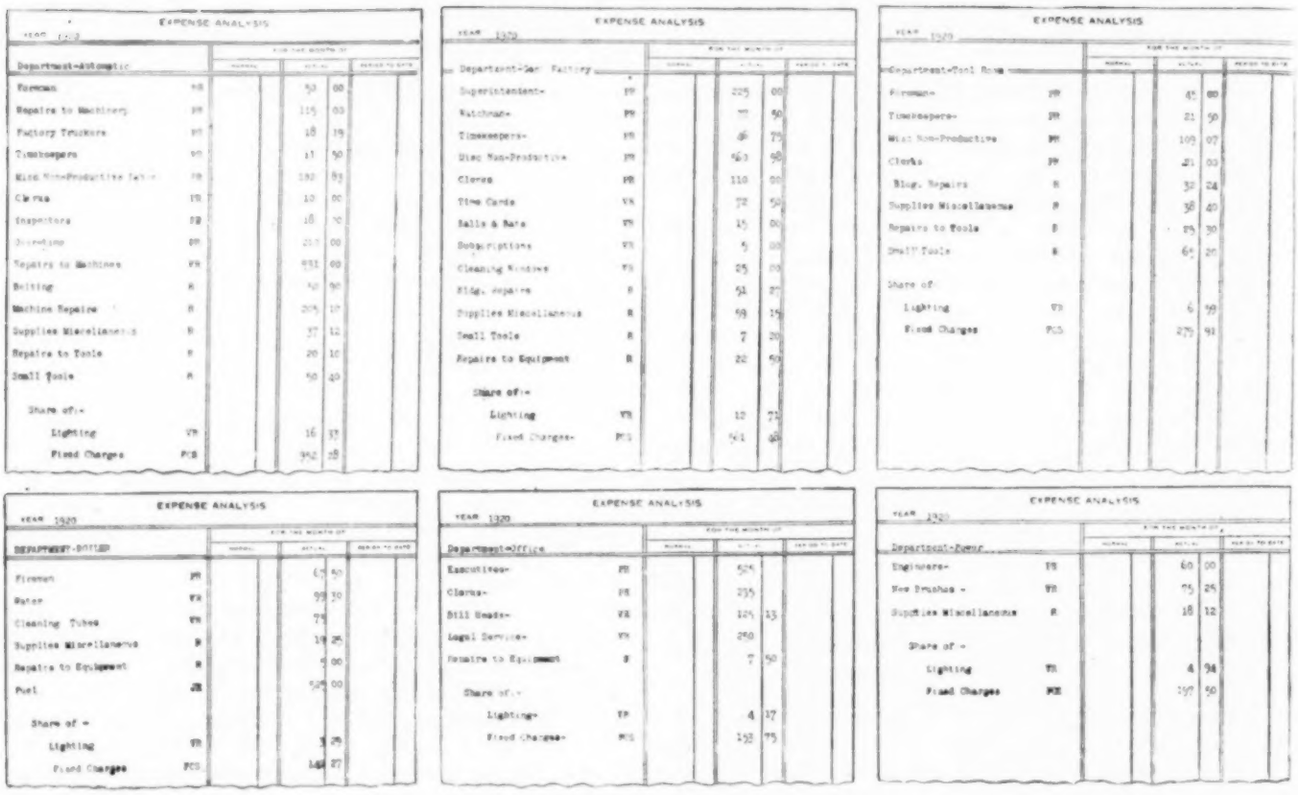


FIG. 76. DEPARTMENTAL EXPENSE ANALYSES

purchased at the lower figure, the cost must be calculated on that basis and in the declining market if the actual material which goes into the product cost $100 a ton, that is the figure which must be carried into the costs although it might be necessary to estimate the selling price on the basis of $60 steel.

It is essential that the cost figures reflect the actual operations of the business. An estimate is a different thing and is ordinarily dictated by outside conditions over which the manufacturer has no control.

Confusing estimates with costs has led to many entirely inaccurate methods of pricing materials. In order to keep the costs and the stores inventory 100 per cent correct, some method of pricing must be adopted which will make the total of the physical inventory check dollars-and-cents-wise with the inventory record upon which the inventory records in the main books of accounting depend; providing, of course, that there have been no actual physical shrinkages.

One common but completely incorrect method of pricing requisitions is to use a so-called standard price which is used throughout the year. We discovered a plant, which, in a period of rising prices, had set the standard price on its materials when prices were low. The standard was not changed throughout the year, although the market price of the material rose rapidly. The result was that the concern was selling much of its product below actual cost at a time when nearly any price could have been had.

Another common and incorrect method is to charge out the materials at the price on the last invoice, irrespective of whether materials purchased earlier at a different price had been used or not. By this method, a completely incorrect figure is reached when the physical inventory is taken.

Another method which has met with a great deal of favor is to use an average price, averaging in the old price with the price of material received later and setting up a new average each month, when the stores inventory is relieved. This also is incorrect.

The only correct method that I know of is the one dictated by common sense, which is to charge out the material at the price actually paid for the oldest material in stock, first. This is sometimes called the "exhaustion of lot" method. It will occur to the reader that it is not necessary in practice actually to use that material first which was received first, but that in pricing out the inventories the price of the first lot received should be used until a quantity equivalent to that lot has been exhausted. The physical inventory is priced in the same way.

To exemplify the use of this method let us consider the case of the man already mentioned who had on hand 30 tons of steel, consisting of three lots of 10 tons each. In pricing out this steel in a rising market, he would use the figure of $60 a ton until 10 tons of steel had been used, whether or not it was the actual 10 tons of steel which was used. When this 10 tons had been used, he would commence charging steel at $80 a ton until 10 more tons had been used and so on. The same method in pricing holds good whether the materials are "productive" or direct charges, or are indirect expense materials. By this method, agreement is maintained between the physical inventory and the book inventory.

Distribution of Overhead

So much for the actual method of pricing. In Fig. 76 are shown the departmental expense analyses which have already been shown in former articles. You will note, however, that we have added to these analyses the expense materials properly chargeable to each department. In later articles, we will show how this overhead expense is distributed to the product.

Locomotive Shop Equipment on Wheels

Locomotives Transferred to Repair Pits by a Traveling Crane—Time Saved by Taking Portable Workbenches and Machine Tools to the Work

By J. V. HUNTER
Western Editor, *American Machinist*

THE locomotive shop of the Chicago & Alton Railroad Co. at Bloomington, Ill., is notable because of the acreage it covers and the great amount of work handled under one roof. It is what railroad men term an overhead-transverse shop with twenty-eight repair pits extending transversely in the main bay and to which locomotives are carried by an overhead crane. The machine and pipe shops are located in a bay on one side of the main bay and the boiler shop in a bay on the other side. The building is 325 ft. x 615 ft., which indicates something of the problems involved in running back and forth with different repair jobs. A part of this running about has been dispensed with by the use of some of the special devices herein illustrated.

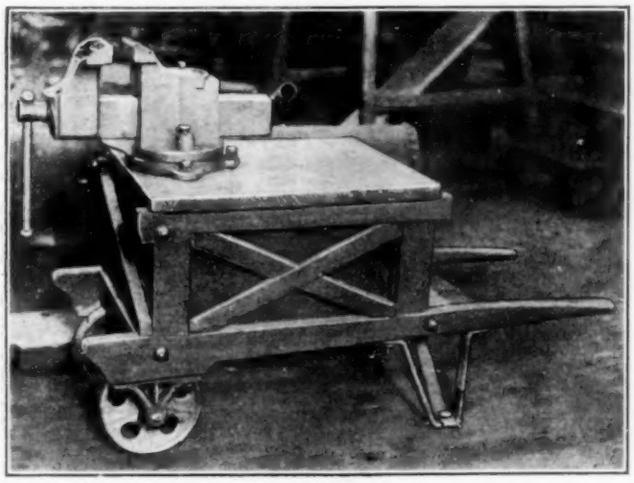


FIG. 1. MACHINIST'S PORTABLE WORK BENCH

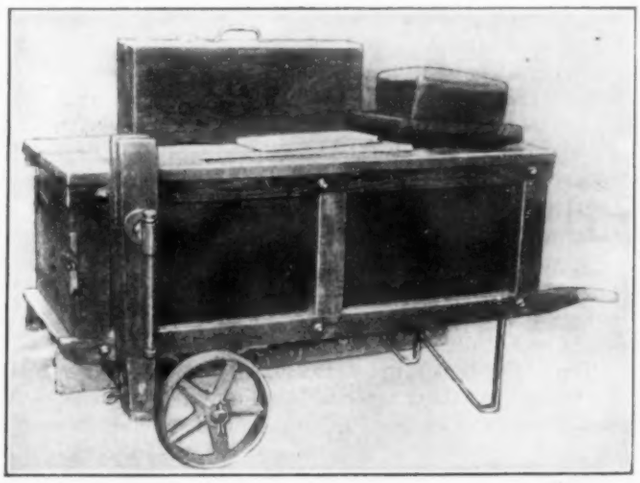


FIG. 2. CARPENTER'S PORTABLE WORK BENCH

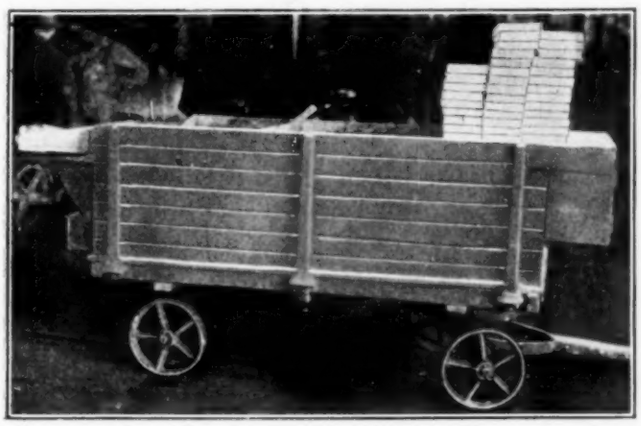


FIG. 3. WAGON FOR TRANSPORTING BOILER LAGGING

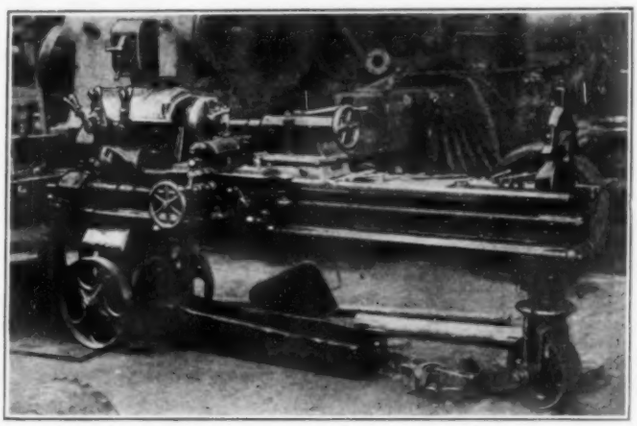


FIG. 4. LATHE WHEELED INTO AISLE

The machinist's work bench, Fig. 1, is wheeled right into the wide aisle between the pits. It is a stout bench of standard height built on an ordinary freight-handling truck. A vise heavy enough for almost any job is mounted on the end so that its weight comes over the wheels. The space under the bench is fitted with a couple of tool drawers that open toward the truck handles and can be padlocked when closed. The pipe-fitters have similar trucks with pipe vises substituted for the machinist's vise.

The carpenters who have work to do in cab-building and fitting are provided with the wheeled work-bench, Fig. 2. The bench is somewhat longer than the machinist's bench owing to the nature of the work. It is built in the tool locker form so the workman can carry a full set of tools with him and keep them safe. A standard wood-workers' vise with wooden jaws is provided on the bench.

In line with the foregoing the men who put the lagging on the boilers have the truck, Fig. 3, for carrying all their tools and materials. This truck replaces the wheelbarrows used for the purpose in many shops and in fact replaces several wheelbarrows. It has compartments or bins for the tools, slabs of lagging, and asbestos cement. The latter is contained in a bin having a slanting end so that its contents can be easily shoveled out.

Pins, bolts and other parts requiring lathe work are turned and fitted right on the job. Four or five Lodge & Shipley lathes, as shown in Fig. 4, can be wheeled into the aisles alongside of the engines and the work handled where it can be more quickly fitted. The lathes are self-contained units with the driving motors mounted beneath the headstocks. Current can be taken from convenient receptacles on near-by columns. A single wheel on a pivoting trunnion carries the outer end of the lathe bed, and the handle by which it is pulled and steered can be turned beneath the bed and laid on the floor out of the way.

Acetylene Equipment Easily Handled by a Truck With Large Wheels

Since the acetylene torch has come to play so important a part in locomotive repair work of today, numerous wheeled trucks have been devised for handling the heavy gas tanks. However, the truck shown in Fig. 5 has several novel features that commend its use. Large wheels are used to make easier going over rough spots and tracks. When stationary, the gas tanks rest firmly on the floor but for moving, a little tilting by the handles throws their centers of gravity more nearly over the axle, so that little effort is required for balance.

A sheet-metal tool box is provided for the welder's torches and equipment and it will be noted that this box is mounted on trunnions so that it will always remain in an upright position.

Even the boiler makers use wheels for easier transportation of their special equipment, and the boiler test-pump shown in Fig. 6 is easily taken from one boiler to another for test purposes. The pump unit is a standard locomotive air pump that now derives its power from compressed air used in the steam cylinder. The former air cylinder has been bushed, greatly reducing its diameter and correspondingly increasing the testing pressure available.

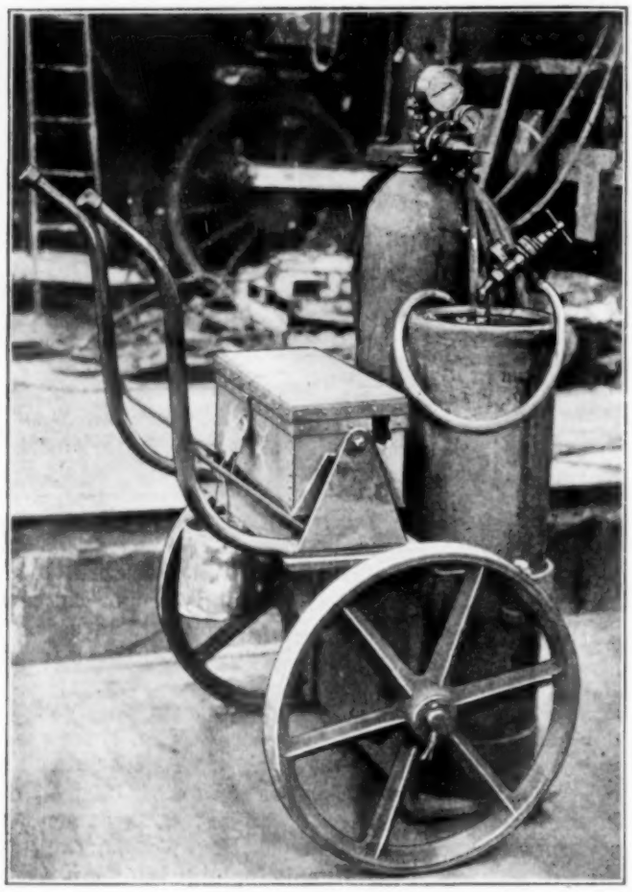


FIG. 5. SPECIAL TRUCK FOR ACETYLENE WELDING OUTFIT

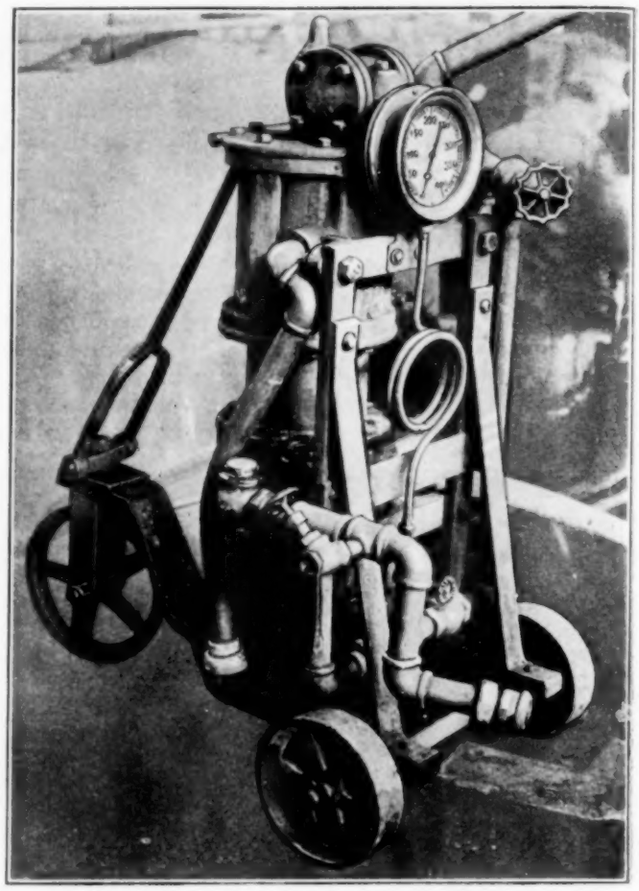


FIG. 6. A BOILER TEST PUMP MOUNTED ON WHEELS

Laying Out a Circular Arc When Center Is Unknown or Unavailable

By R. H. Stalnaker

I have read with much interest the article under the above title by Wm. S. Ayars on page 112 of the *American Machinist*.

However, as Mr. Ayars' equation (7) involves the determination of the radius, it would seem that the simpler formula (8) is the preferable form. The use of this equation can be still further simplified by factoring the expression under the radical, thus:

$$x = R - \sqrt{R^2 - y^2} = R - \sqrt{(R + y)\ (R - y)}$$

There are several typographical errors in the formulas as printed, the corrections being as follows: y should be y^2 in the formula in the next to the last line in the left-hand column on page 112.

The quantity under the radical in equation (7) should be

$$\sqrt{\left(\frac{L^2 + h^2}{2h}\right)^2 - y^2}$$

In the comparison of values obtained by differing formulas on page 113, the difference for the value of 5 for y should be 0.60 in. instead of 0.06.

Training Trade Teachers

Growth of Vocational Training Necessitates the Training of Competent Faculty—A Problem for Manufacturers—How Toledo Organized a Course of Instruction

BY LAURENCE PARKER
Vocational Director, Toledo, Ohio

VOCATIONAL or trade evening classes, part-time and co-operative classes, organized under the Smith-Hughes law, are now well known to most of us. The training of the teachers for such classes, a very important and interesting kind of work, has been given but little publicity.

The teaching of trades is a new road opening before the skilled mechanic. It is fascinating work. Not only is the teacher supervising the operation of the machines in the school shop, but he is training the hands and brains of boys and men, that they may become "master workmen."

In Toledo the training of "trade teachers" is in its second year. It is supported from Smith-Hughes funds and is under the direction of Prof. E. L. Usry, of Ohio State University, who makes frequent visits so as better to direct the course. The work is under the local supervision of the Vocational Director of Toledo. Classes meet two evenings each week for two years, a total of 64 weeks of instruction. There are no fees in connection with the work. The requirements for admission are as follows:

"EVERY MAN SHOULD BE ABLE TO MAKE PLAIN, SIMPLE SHOP DRAWINGS—"

1—At least five years of experience in the trade that it is desired to teach.

2—The equivalent of an eighth grade education.

3—Good health and good moral character.

4—Giving promise of usefulness as a teacher.

It is made clear to those taking the work that appointments to teach cannot be guaranteed. Neither does the man have to promise to teach should the chance come. There will be a great demand for these men in the future, provided that the training work has been well done. In Ohio it is required that graduates of this course be used for all Smith-Hughes instruction when available.

The outline of the work as presented in Toledo is as follows:

First Year

Shop Drawing—Two hours a week for the first 16 weeks.
Shop Mathematics—One hour a week for 32 weeks.
Theory of Teaching Trades—One hour a week for 32 weeks.
Practice in Teaching—Two hours a week for the last 16 weeks.

Second Year

Shop English and Shop Science—Two hours a week for 32 weeks.
Trades Organization and Practice in Teaching — Two hours a week for 32 weeks.

The work is not presented in exactly this order in some other cities in Ohio, and we shall probably shift it somewhat from year to year until a satisfactory program has been worked out.

Instruction in the First Year

Considering the first subject of instruction, every man should be able to make plain, simple shop drawings, with the use of a pencil, compass and a rule of some sort. It is surprising how many shop men of skill there are who cannot do this. The instruction in shop drawing includes not only this phase of the work but also the making of free-hand blackboard drawings. There is no way to get things over as effectively as by means of chalk talks; but to make them effective, training is necessary. The instructor for this class has to be chosen with care, for his class is made up of men who cover a wide range of ability in drawing.

Shop mathematics are taught not only for the purpose of brushing up the mathematics of the trade teacher, but also to show him how to present mathematical problems to his class when it is best for him to do so.

The theory of teaching trades sounds as though it were a dreary subject, but it proves an interesting one indeed. It includes the simple fundamentals which should guide teacher or foreman when he must teach a man how to get out his work. The course consists of one hour of lecture and discussion throughout the first year. As this is not an exact science, and since people differ so in their ideas as to how men should be handled, there are always lively discussions.

Because of the connection with the vocational evening classes of the Toledo Public Schools, a splendid opportunity is provided, not only to recruit the best candidates for the teacher training classes, but to determine the best possible practice in teaching for them by observation in the evening school classes and by assisting the instructors. This has proved to be helpful to men in their trades. Then too, all men love to criticize the efforts of others. After the class has been on the side lines and watched an evening school instructor put over his work, discussion wages fast and furious.

Subjects of the Second Year

To many men the second year is more interesting than the first. Shop science is taken up. This is

probably most successfully taught by some man who has been a physics or a chemistry teacher and who has left school work and gone out into industry in some such capacity as industrial chemist. He must have had contact with the practical sides of industry, or he will prove a failure.

Instruction in Trade English a "Sand-Papering" Process

The instruction in trade English is a sort of general sand-papering. It includes putting patches on the grammar of the workman, as well as the following topics: Keeping of notebooks, writing of reports and business letters, and encouragement in keeping up with the printed page in connection with the trade being studied and the allied trades. It is an interesting subject and does the average skilled mechanic a world of good.

The Second Year

More practice in teaching is given throughout the second year, and in connection with it comes the subject of trade organization. There are many things that a skilled mechanic does without conscious thought; they have become second nature to do them, just as buttoning clothes and lacing shoes. Too often the only things that stick in his mind are the hard things or the things which he has had trouble with. When he teaches the apprentice boy in the shop or the boys in the school shop he is apt to start too far above their understanding of the trade, and to take for granted that "any fool ought to know" the things that he himself does sub-consciously. It is to overcome this that trade analysis is intended. It trains the man to break his trade up into its elements, and to grade the parts according to the best order in which they should be taught so as not to kill interest, to discourage the student or to make spoilage excessive. This subject has proved a revelation to the average mechanic.

One man who was at work on the subject this summer came to us in surprise and declared, "I learned my trade 17 years ago in one of the best shops. I have worked at the trade ever since and have done some studying through the years. When it came to the anaylzing of the trade and outlining it as I would teach it, I have discovered that there are many things that I have taken for granted or merely thought that I knew all these years. I have had to spend considerable time at the library patching up my understanding of the trade."

An Interesting Subject

This, in brief, is the description of the course. It is a hard thing to describe it and make it sound as interesting as it really is. The course and each subject are changed from time to time to make them fit more closely to the particular needs of the men taking the work.

We find that the course appeals to foremen and to those who wish to become foremen some day, as well as to those who desire to train as trade teachers.

It is one thing to teach men to go out into the world to earn their living and to make things. It is infinitely more interesting to train the men who shall do this teaching. It is the pattern making of trade or vocational education.

Shop Layouts

By John Jacobs

Does it pay to make a shop layout on the drawing board? Most emphatically yes, it does. One of the very large auto plants that was prominent in war work used this method with good success. A department was organized, which was called, the "Planning Department." Its personnel was composed of expert practical and theoretical men, who would consult each other freely. When a new department was to be organized or changes of any description were to be made within a department, the planning department would receive orders to make the layout.

The procedure was as follows: First a board was covered with cross-section paper of one-tenth-inch division. This was pasted to the board with library or photo paste and then wet thoroughly by means of a sponge. After it had dried it was perfectly smooth. The next step was to cut dummies, as they were termed, of cardboard, to the greatest outside dimensions of the machines to be placed. A lathe dummy would include he taper attachment or if motor-driven would include space required for motor. A radial-drilling machine dummy would include space required to swing the arm. Milling-machine, shaper and planer dummies would include space for the extreme travel of the tables or if any other fixture or stock box would be an adjunct to the machine, the dummy would include the space required by such appurtenances. All dummies would be cut to the scale 0.2 in. equals one foot. After the man commissioned to make the layout was satisfied with his conception, the foreman was called in and allowed to criticise and if both of these men were satisfied the dummies were pinned to the board and the superintendent was called. When he was satisfied, blueprints of the layout were made. Usually no particular attention was given to the overhead work such as belts, countershafts, etc., because at this plant a competent maintenance man will take care of that end of the work. However, in a small shop overhead work would have to be given due consideration.

On this layout every post, down spout, pilaster, drinking fountain and door was marked to scale. In the planning department room was a permanent complete layout of the whole plant which contained some 5,000 or more machines. The layout was an exact miniature replica of the plant, a part of which was five stories high. Perhaps the readers may appreciate the value of this. It was so comprehensive that visitors would usually be taken there first so they would grasp the general plan and *modus operandi* of the plant.

In the planning department was also a file containing a record card for each machine. On this card was given the name of the machine, the selling agent's name and address, the manufacturer's serial number, the shop record number, the cost of the machine, the factory order number, the date of order, the date of receipt, the date installed, the department in which it was placed and a sketch drawn to scale with dimensions. Another file contained load cards, one for each machine, filed departmentally. Copies of time studies also were filed and they were consulted when a new layout was contemplated.

The whole plan was simply a graphic method of establishing records and statistics, which is not only helpful but is becoming more and more a necessity.

Inspecting Pistons and Connecting Rods

Importance of Inspection Methods to Quality of Product — Some Methods in Use on Essex and Studebaker Pistons and Connecting Rods

BY FRED H. COLVIN
Editor, *American Machinist*

ONE of the inspection benches is shown in the headpiece as well as the piston storage rack at the back which is quite similar to that used by the Chandler and other companies. This rack is mounted on good size wheels or casters so as to be easily moved about the shop. The benches shown are of a convenient height and covered with sheet metal so as to make it easy to prevent the accumulation of dust and dirt on the inspection surfaces. Each bench has a large drawer for needed gages and other inspection instruments, the

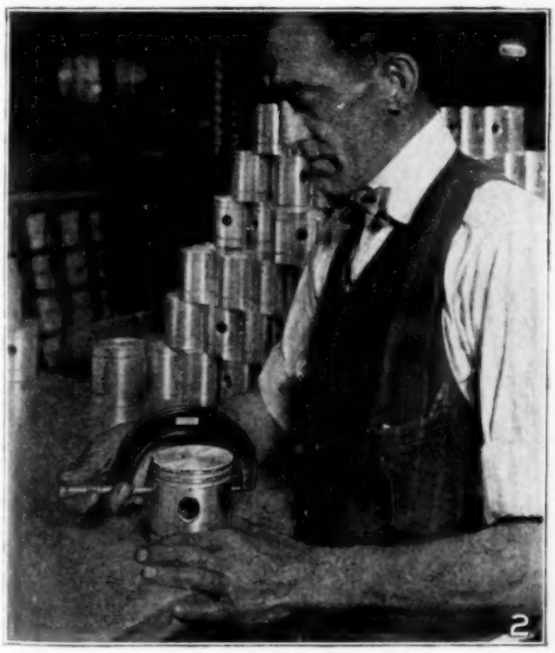


FIG. 2. MEASURING DIAMETER OF PISTONS

FIG. 3. MEASURING THICKNESS OF PISTON WALLS

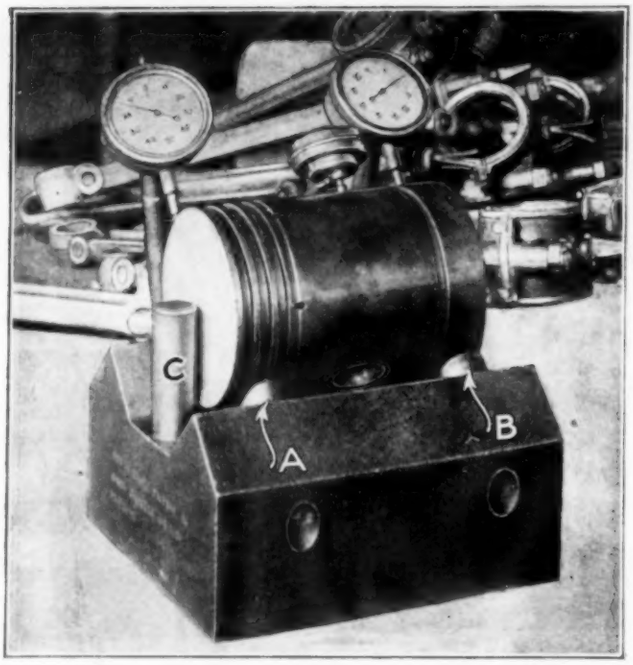


FIG. 4. TESTING THREE DIAMETERS

whole being arranged for the convenience of the inspector.

These benches are located near the motor assembly so that no time need be lost in getting the inspected pistons into the motors. The motor assembly frames can be seen in the background.

Various kinds of gages are used, Fig. 2 showing the micrometer in use measuring the diameter of the piston at various points. In Fig. 3, a special gage is shown for measuring the thickness of the walls of the piston. Its operation can be readily seen by noting the long multiplying lever which magnifies the variations in the wall thickness. A spring holds the heel of the pointer in contact with the wall so that it is only necessary to move the gage up and down the skirt of the piston to note the variations shown by the outer end of the pointer.

It will be noted in the stock of pistons at the left, that all holes are drilled both in the ring groove at the lower end of the skirt and over the piston-pin hole just below the second ring groove. The latter holes are at the upper part of the relieved portions over the piston-pin boss. This view also shows the grooves in the end of the piston-pin hole into which the retaining ring snaps to prevent the piston pin working out and coming in contact with the cylinder walls.

The Essex pistons are of die cast aluminum alloy.

Studebaker's Methods

The method of the Studebaker's shop differs considerably from those just shown, but some of the leading fixtures are extremely interesting as will be seen.

Fig. 4 shows the gages for piston diameter for two different sizes of pistons. The upper row is for pistons for the 3½-in. diameter cylinders while the lower row is for motors having 3⅜-in. cylinder bore.

This gaging board gives six diameters ranging from 3.4945 to 3.497 in. for the smaller piston and from 3.8695 to 3.872 in. for the large piston. This gives a maximum of 0.0055 in. and a minimum of 0.0030 in. in both cases and it will be noted that these dimensions are all below the basic size which is in accord with the best accepted "standard hole practice." By use of this arrangement six sizes of pistons can be gaged, allowing selective assembly by picking out those which have just the right amount of clearance in the cylinders as the motors are assembled.

The gaging instrument shown in Fig. 5 indicates both the diameter and the eccentricity of the piston at three different points. The piston is supported on hardened steel blocks, two of which are shown at *A* and *B*, and is located endwise by the stop pin *C*. After the piston has been placed in position and the diameter readings taken, it is revolved slowly and any eccentricity noted.

Testing for Squareness of Hole

Then comes the test for the squareness of the hole with the piston body as shown in Fig. 6. The gage plate *A* with the pin *B* at right angles to it is mounted on the upright *C* so as to be convenient for the inspector. Looking toward the light, the inspector places the piston on the pin B and by looking between the piston and the plate *A*, he can at once see whether the hole is square with the outside of the body or not. This is a very convenient testing device and one which can be used in many other cases.

The pistons are then weighed on the scales, shown in Fig. 7, and each piston stamped both as to size and weight. This makes it easy in assembling to pick the right set of pistons for a given motor.

The method of testing connecting rod alignment is

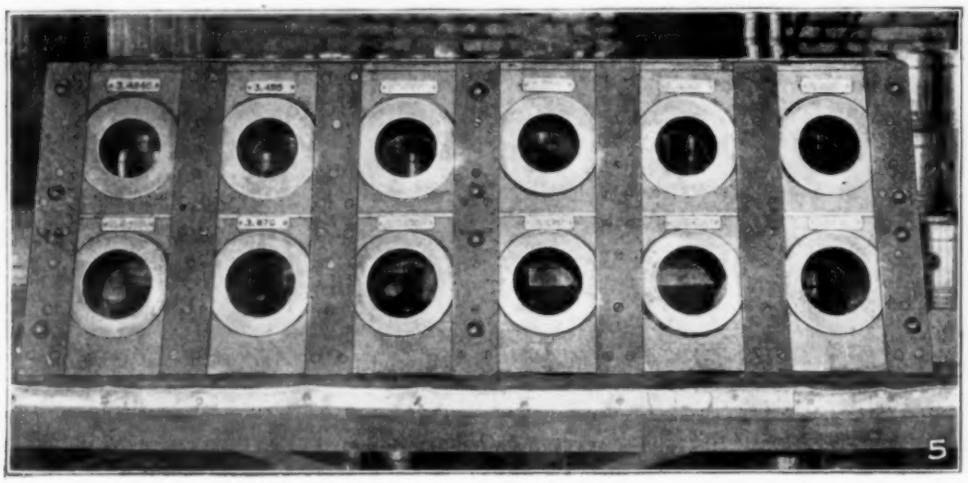


FIG. 5. SELECTIVE GAGES FOR PISTONS

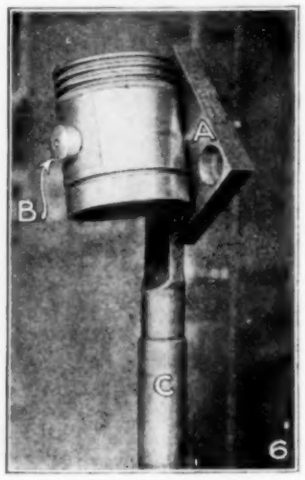


FIG. 6. GAGING SQUARENESS OF HOLES

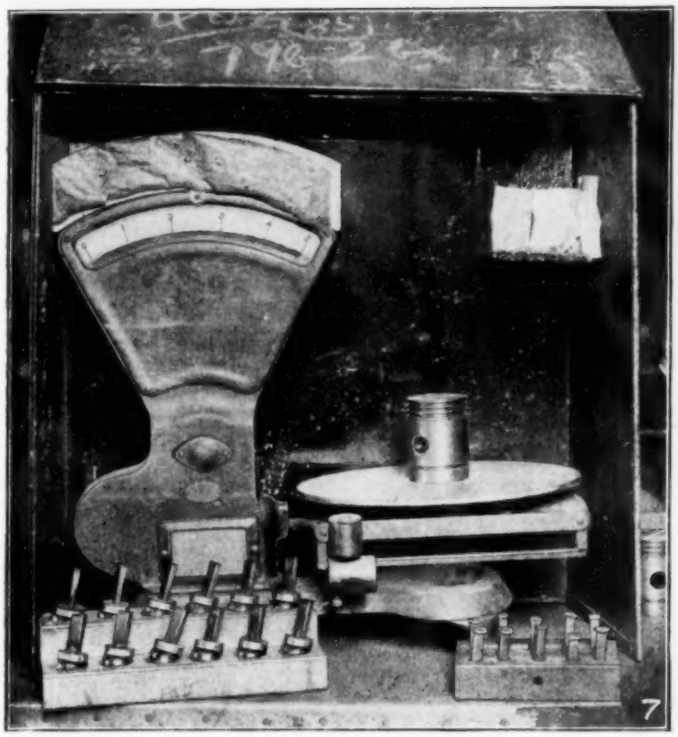


FIG. 7. WEIGHING THE PISTON

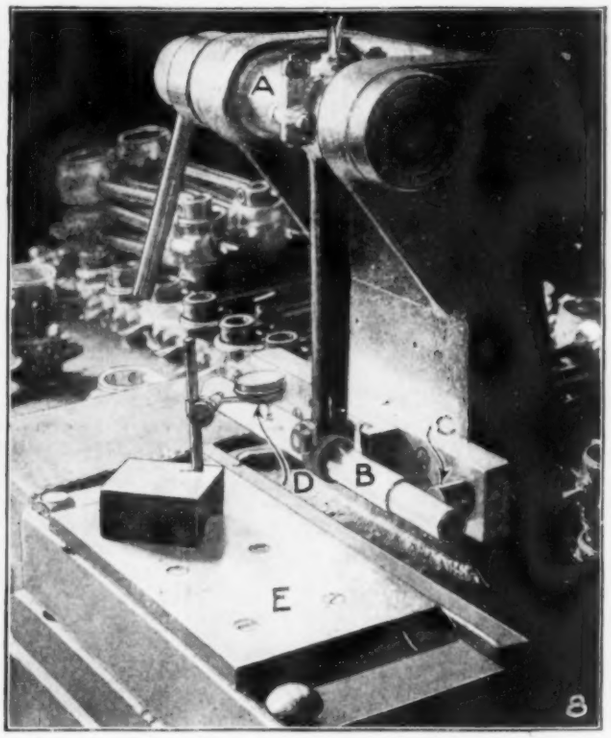


FIG. 8. TESTING ALIGNMENT OF CONNECTING ROD

shown in Fig. 8 where the plug *A* holds the large end of the rod while the bar *B* in the small end easily detects any variation in alignment in either direction. Two accurately ground pins, one of which is shown at *C*, test the alignment in one direction, while the dial indicator *D*, mounted on a base which moves on the surface plate *E*, shows any variation in the opposite direction.

After being tested for squareness the connecting rods go to the departments shown in Figs. 9 and 10, where the rods are inspected both for total weight and for balance. Fig. 9 shows a rod just being placed on the scale for total weight while Fig. 10 shows how the heavy end of the rod is weighed with the small end suspended from a suitable rod.

Behind the operator in each case is an open rack or bin, in which the rods of different weights are put together. These open bins make it possible for the next inspector to pick the different rods for the second inspection from the other side and to again sort them with reference to both the total weight and the balanced weight. This method also solves a transportation problem as the rods pass through the weighing department to the point where they are assembled to their pistons and from there to the motor itself.

When the connecting rod has been assembled to the piston, the assembly is tested for alignment in the fixture shown in Fig. 11. Here the upper end of the rod is held in position by the plug *A*, while the plate *B* tests the squareness of the piston with the rod itself. The plate *C* simply insures the piston being vertical with the rod, while the plate *B* shows how much if any, the piston is out of square owing to its pinhole.

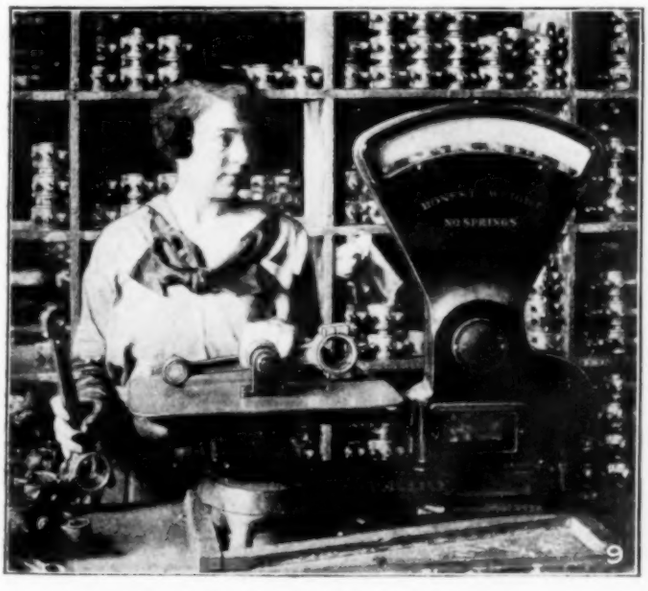


FIG. 9. WEIGHING THE ROD

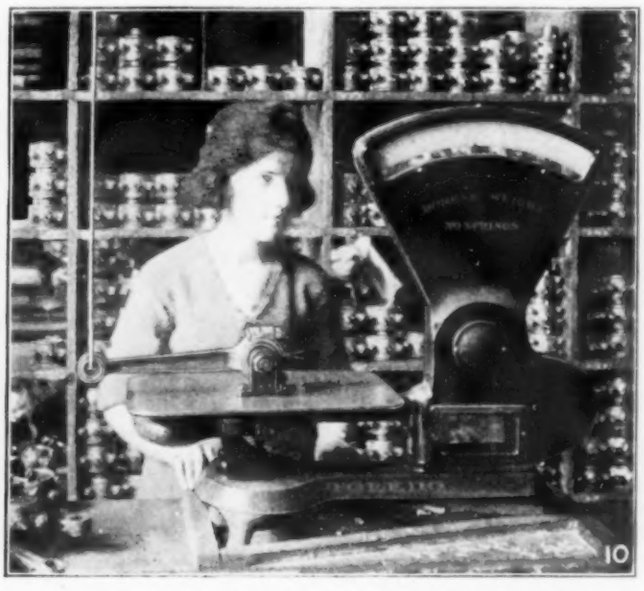


FIG. 10. WEIGHING THE LARGE END OF CONNECTING ROD

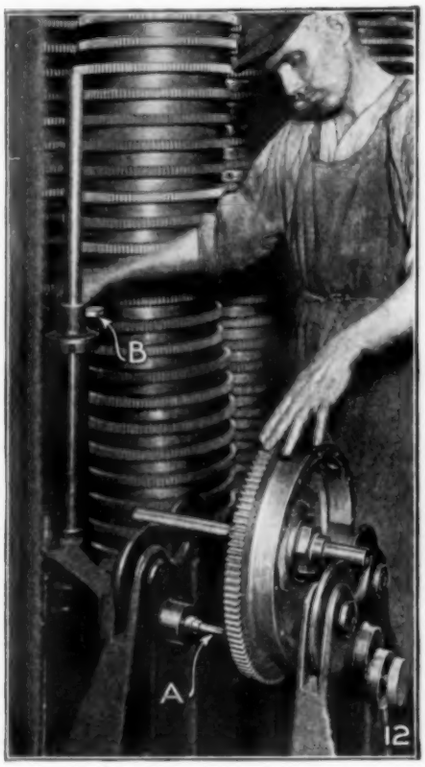


FIG. 12. TESTING FLYWHEELS FOR SIDE MOTION

FIG. 13. INSPECTING VALVE ROD GUIDES

FIG. 14. TESTING CONCENTRICITY OF GEARS

The flywheel of the Essex motor is very carefully tested for concentricity and side motion. Fig. 12 shows the roller testing stand used with a flywheel mounted in position. It also shows the plunger *A* which tests the side motion, this being moved near the wheel or into contact with it, by the handle at *B*.

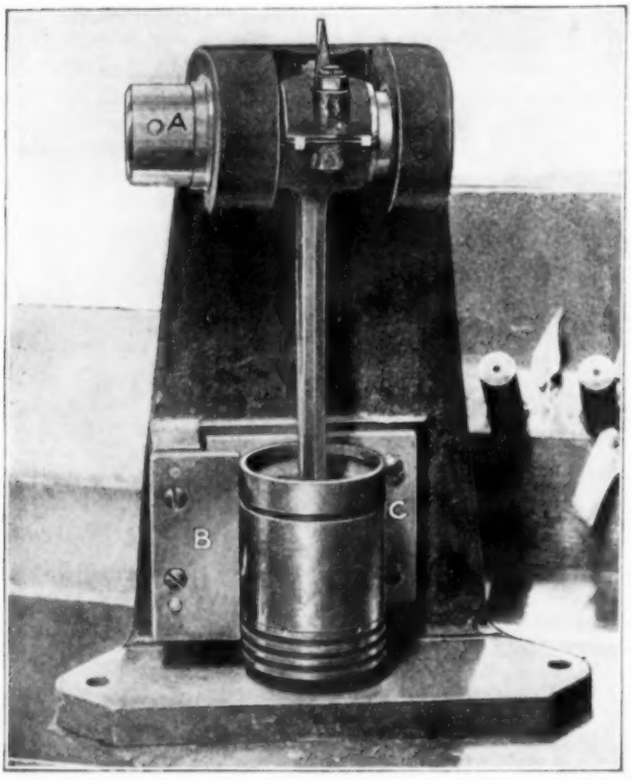


FIG. 11. TESTING ROD AND PISTON FOR SQUARENESS

Fig. 13 shows the fixture used for inspecting the valve push rod guide. The guide is mounted on a mandrel and revolves between centers, the two dial indicators shown, telling the eccentricity between the hole and the outside.

The testing fixture shown in Fig. 14 handles the helical timing gears, the dial indicator showing the movement due to any lack of concentricity in the gears. The handle by which the gears are revolved can be easily changed from one gear to another, so as to make either one desired the driven gear. A third shaft is provided for testing the generator gear, which is driven from the large gear in the center. Both the outside gears can be adjusted with relation to the central gear by the hand nuts shown.

Personality

BY W. D. FORBES

The power of personality, brought up by J. E. Bullard on page 505 of the *American Machinist*, is most interesting, as are also the remarks he made on trade unionism. Personality is born in a man but it can, without doubt, be cultivated if a start is made early enough in life.

It is extremely difficult to exactly define what personality is; certainly it is not always best expressed by words as it can be far better shown by the manner of a person. Let me give an example which I take from my own experience.

I was living in France and wanted a position, so I obtained some letters of introduction to a man known the world over.

I presented the letters, obtained an interview and subsequently a position. When I left the office after the interview I was what the boys call "chesty" for I felt that the man had been on the lookout for a young man just like me for a very long time and now that he had

found me he felt that he could settle back, feeling that my department would give him no further trouble, and I would show him that he was a judge of men. I soon discovered that every man in the employ of my chief had exactly the same feeling and we all worked together in a way which gave results. In my later intercourse with the chief I never knew him to say bluntly, "Well done" but the very way in which he inspected your work carried with it an air of satisfaction and praise, and if anything was not just to his liking he was able to so point it out that you would not sleep until you had met his wishes perfectly.

In my school of engineering another form of personality was shown by the regard we students had for one professor. He had the marvelous ability of making each student feel that he was particularly interested in him and we all felt that if we "flunked" in examination on the professor's particular subjects we would be disgracing him. He also conveyed the impression that he was really a fellow student, not merely an instructor and the result was that we strained every nerve to pass all his subjects without fail. Again, a proprietor was leaving his works when a man who was rather drunk stopped him and asked for a job stating that there was not a machinist in the state better than he. The proprietor asked the man if he could prove it and was assured that he could, and he added, "You know that all good machinists go on a drunk at times."

"That may be true, but my friend," said the boss, "a man who gets drunk often does not stay a good machinist long. Come in Monday and I will give you a job if you will agree that you will only get drunk when I do."

The man came in to work and to my knowledge did not get drunk for 19 years. He was finally given the best work in the shop and the pride he took in the trust placed in him kept him straight. He told me one day that what started him straight was the statement of his boss that a good machinist did not stay good long if he got drunk, and this followed by the confidence reposed in him did the work.

Appreciation an Aid

All of us have felt the desire to make ourselves of true value provided we felt in so doing we would be appreciated; without that feeling none of us can do our best. I have read a lot of shop papers and in all of them there seemed to run the constant expression of "Get out more work." Now this does not please the workmen, they resent being educated as we may call it, just for the boss's advantage. I have seen men praised in shop papers, but after the praise there was always the admonition "More work" or "Do better next time." It is far from a question of more pay that makes men contented; it is a feeling that they are a useful part of the business which pleases them. That they are working with the boss and not only for him.

The great majority of machinists have been contented in the past and hundreds of homes all over the country prove that their wages have not been so low that they could not save. True; I believe that the good machinist has not had enough more pay than the poor machinist to make things look fair, but the trade is one which has advantages in steady employment and comfortable surroundings, so as to somewhat offset the lower pay as compared with some other trades. The discontent which is supposed to exist all over the country among machinists is largely a myth, as any one going among good machinists can easily prove. The discontent is manufactured by agitators who can work their jaws much better than they can their hands and make far better pay at it.

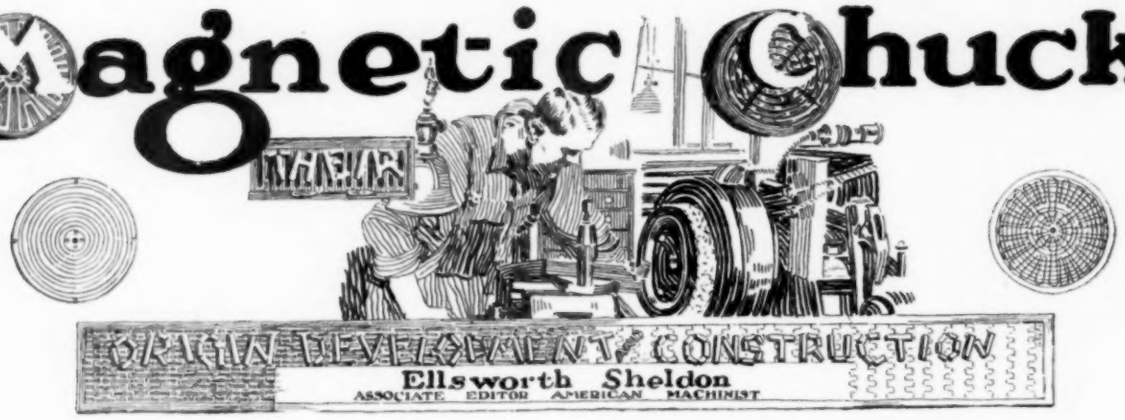
There is a "cure all" despite Mr. Bullard's ideas to the contrary, but it is slow in action. It is proper education and by that I do not mean a change in the public school system but a change in the reading matter given to the working man. The trade papers are of the very greatest help in this direction but they do not go to the working man, as I consider that they should. We all see that the value of a subscription lies in the purchasing power of a subscriber and a man standing at his lathe or planer has little such power, and I should doubt if a machinist's subscription is of any commercial value to a trade paper, even at the price of five dollars, which is, I think, the "top notch" at which a mechanic is able to pay for a weekly paper. So the trade paper does not fill the mission of a widely circulating educational paper. I can not see how what may be termed an educational shop paper can be made to pay, but I do not think that that is a reason why the proprietors of shops all over the country should not be willing to put up the money for a purely educational shop paper. The trade unions spend money like water to educate their members in their way of thinking, while the business men spend money to fight, but they do it in an unsystematic way. Anything that is fundamentally bad can be cured—whatever is good in the system of unionism will last—and it is only by proper education of its members and those outside of it that the bad can be shown up and thrown out—and there will have to be a lot thrown out. The personality that I remarked upon shows up everywhere. All the readers of the *American Machinist* know that the articles of some of its writers are more acceptable to them than are others. It is largely how what they have to say is put, and that is personality. It is individuality which holds the trade unions together and when that begins to wane the end is drawing near. The obedience that once was in the ranks of unions has been largely swept away; first by the efforts of the I. W. W.'s and then by the great increase of its membership. These facts show the chance now at hand to educate properly. When the leaders cannot control the members of their unions then they can not be forced to keep their bargains or break them and the power of the union is lessened.

To give proper education its exact meaning is more than hard but it does mean that the men should be disabused of the idea that all education is given them only with the idea of resulting in their producing more work.

The trade unions have taught the proprietors their lesson and they have remembered and really learned, while on the other hand the trade unions have simply learned that power is sweet and its taste has turned their heads; they have reached and passed their zenith; they have not learned and remembered. The fundamental idea of unionism is today lost sight of; what it now wants is only power, power that if obtained would not or could not be used wisely and in fact would only be used to advance some one man or group of men—and either spells disaster. No man can serve two masters but the trade unions say there must be no master; yet they themselves have most exacting ones. The words to be found in the "Deserted Village" are true:

"Just experience proves on every soil
That those who think, must govern those who toil."

Magnetic Chucks



Ellsworth Sheldon
ASSOCIATE EDITOR AMERICAN MACHINIST

III. The Father of the Magnetic Chuck

Real Inventor of the Magnetic Chuck—Early Experiences—Experiments with Magnetic Brake—Magnetic Chuck an Accidental Discovery—Growth of the Business

IT IS proverbial that there is nothing new under the sun; yet there occasionally comes into our industrial life a device that has no apparent precedent and for which no recognized demand exists.

Presumably nobody ever begged James Watt to devise a machine that would make the wheels go around; assuredly no one ever implored Alexander Graham Bell to perfect an instrument by means of which a man in New York could hold converse with a man in San Francisco; yet both the steam engine and the telephone became indispensable almost from the moment that they became practicable. The magnetic chuck is in a sense to be considered as belonging to the same class. It was without practical precedent, and because nobody knew of it there was no demand for such a device. People got along very well without it when they were ignorant of its possibilities; yet many modern production methods would be out of the question were it not for the readily available means offered by it for holding work on planer or grinding machine without the use of bolts or straps.

OAKLEY S. WALKER

Although the magnetic chuck made its first public appearance in 1873 it apparently did not impress the mechanics of a half-century ago as being a valuable accessory to the machine shop, for from that date to 1896 nothing was heard of it, and so far as I am able to learn none were in use in this country.

The first chuck could hardly be considered a practical tool. Partly because of structural weakness inherent in the design; further, because of the lack of distribution of its magnetism; and principally because there was at that time no dependable and generally available source of electrical energy to operate it, the device was more in the nature of an interesting experiment of amateur dabblers in the then comparatively little known science of electrotechnics, than a practical tool.

The reader will remember that one of the patentees of the original chuck of 1873 was an Englishman by the name of John Thomas Oakley, while the name that was later to become synonymous with magnetic chucks was Oakley S. Walker. This similarity of names will promptly lead the reader, as it did the writer, to suspect that there was more than mere coincidence involved; but Mr. Walker assures me that such is not the case, and that until the early patent was cited to him from Washington upon his application for protection of his idea he had never heard either of John Thomas Oakley or of such a device as a magnetic chuck other than his own.

To Mr. Walker must therefore be given the credit not only for the development of the magnetic chuck to a point where it has become an indispensable part of the equipment of an up-to-date machine shop, but also for the conception of the device, as well as for the foresight to recognize the value to which it would eventually attain and the perseverance to keep everlastingly at it until he had compelled its recognition by the trade.

Like many another valuable invention the magnetic chuck was the accidental outcome of a search along other lines. Early in his career the inventor had been interested in mechanisms for braking railroad trains, and it was while working upon a new application of this kind that he discovered his device to have a much wider and more valuable application in an entirely unpremeditated field than in that for which it was designed.

Oakley Smith Walker was born in the village of South Rutland, New York State, some years before the Civil War. His father died from injuries received in the war, leaving the boy with a mother and several sisters for whose welfare he was partly responsible.

His first factory experience was in a wood working shop, but this sort of work did not satisfy his penchant for mechanics and after two years of making handles for feather dusters, brushes, etc., he became apprenticed in 1873 to Ryther & Pringle of Carthage, N. Y., who

conducted a general machine shop and jobbing business. Here he served three years and having completed his apprenticeship went to work for the Eames Vacuum Brake Co. of Watertown, N. Y., where was built one of the most successful of the braking devices before the advent of the Westinghouse Automatic Brake.

With the Eames Co. he remained for several years; going in 1879 to England for the purpose of installing and demonstrating the Eames brake on some of the railroads of that country. It was while engaged in this work that he obtained the experience with mechanisms for stopping swiftly moving railway cars that was to lead indirectly to the invention of the magnetic chuck.

Some years later we find him in business for himself in Watertown, where he manufactured a machine for grinding lathe centers and experimented with the machine for grinding twist drills that was afterwards to become so well known as the Walker Twist Drill Grinder, probably the first machine on the market for the purpose. On a selling trip to New England he became acquainted with Milton P. Higgins, then superintendent of the Washburn shops of the Worcester Polytechnic Institute, with whom he made arrangement to bring his business to Worcester and develop the twist drill grinding machine. Pursuant to this arrangement he removed to Worcester in 1887 and remained at the Washburn shops for three years.

About the year 1885 Mr. Higgins, with George I. Alden, a professor at the Institute, purchased the emery wheel business that had but a short time before been developed by F. B. Norton and founded the industry now known as the Norton Co. to make grinding wheels; later engaging Mr. Walker as their mastermechanic to establish a machine shop.

Mr. Walker had been for many years a dabbler in the science of electricity; as a young man he had built experimental telephones, following the principle of the Bell instrument, with which the people had become familiar during and after the Centennial period of 1876; he had made several magnetic clutches for stopping and starting machine tools; and was much interested in the electrification of the street railroads that was at this time (1890-1895) in full swing.

It was here that his early association with railway brakes showed its influence, for Mr. Walker's experiments took the form of devices for stopping, instead of machinery for running, the electric cars. Every newly equipped city line and interurban road had to have larger and heavier cars than any of its predecessors; every motorman had to find out by experiment just how fast he could go without killing too many of the populace. Hand braking was inadequate to the purpose of stopping the swiftly moving interurban cars, and nobody as yet had dared to propose the compressed-air operated brake of the steam railroads with its necessary accompaniment of air pumps, tanks, complicated valves and systems of piping.

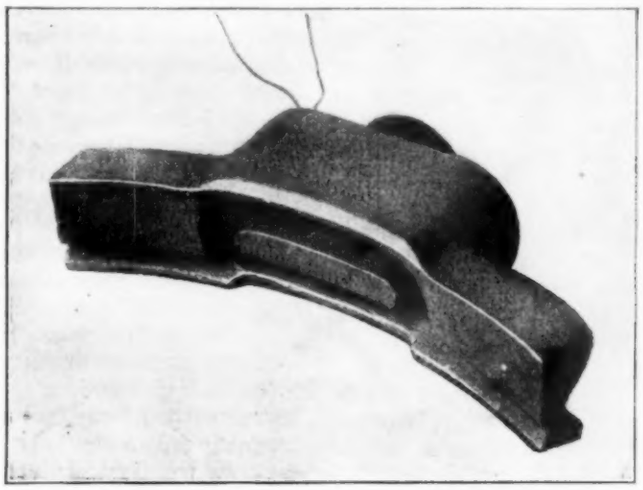


FIG. 50. THE MODEL BRAKE SHOE

It occurred to Mr. Walker that if his favorite exemplification of power—electromagnetism—could be relied upon to make a car go it surely could be depended upon to stop it—the electric brake was obviously the appropriate apposite to the electric car; therefore he built the model brake shoe shown in Fig. 50 to test the practicability of the idea.

This model was arranged to be suspended from a frame exactly as in a real car the brake would be suspended from the truck frame, and a model car wheel made upon which it could demonstrate its braking power. The pocket to be seen in the illustration about midway of the shoe held the coil of wire that surrounded the central core of the magnet; the core being a projection from the bottom of the pocket and cast integral with the shoe, its outer end coming even with and being finished as a part of the concave surface of the latter so that it took its share of the bearing upon the wheel. The current for operating the model was supplied by a single cell of dry battery, this small current serving amply to demonstrate the possibilities of the device for braking purposes when the larger currents obtainable from the line or the car motors were available.

Though Mr. Walker did not at that time see it in such a light, he had here a perfect working example of the single-magnet chuck. The active pole was the outer end of the projecting core (the end toward the wheel); the magnetic currents from the other end of the core were led by the surrounding metal to the remaining surface in contact with the wheel. Though the holding surface was concave it was made so only to match the wheel; if it had been flat and the device fastened to bench or machine table it would have been a chuck.

Though the model worked to perfection, the idea was destined to failure as a practical brake for the reason that long before the difficulties attendant upon its application could be worked out the standard compressed air apparatus, against which no other device need be for an instant considered, was on the job. One car, however, on the Worcester North End Railway, a line then under construction from Worcester to Greendale, was equipped with the Walker brakes.

The obvious source of energy for such a device on a trolley car would be the trolley wire, but it is entirely conceivable that a trolley might run off the wire and leave a runaway car helpless at a critical moment; therefore the experimental brakes were so wired into the car circuit that the brake coils could be shunted across the terminals of the motor armature, thus providing the safety factor.

Mr. Walker cheerfully admits the failure of the device. It worked perfectly—altogether too perfectly—for when the brakes were applied the swiftly running motor armature, impelled by the momentum of the car, promptly generated so much current that its own windings were burnt out.

Though the defect might easily have been remedied by interposing a graded resistance in the circuit, Mr. Walker recognized the inadequacy of the device because of the lessening braking power as the speed of the car decreased and because there would be no braking power at all to hold a standing car on a grade.

Conception of the Magnetic Chuck

He was the more willing to acknowledge the failure for the reason he had become impressed with the capacity of the electromagnet for holding on to things and at once turned his attention to the possibility of using it to hold work on a grinding machine. The surface grinding machine was at this time in extensive use as a toolroom machine principally for the purpose of finishing the surfaces of hardened work, and as the pieces were almost always to be finished over the entire exposed surface it was very difficult to hold them by means of bolts and straps, while a vise was also in many cases impracticable.

The idea of simply laying a piece of work on the table of the machine and having it stay there without any apparent means of holding it appealed strongly to Mr. Walker, as indeed it might to any one after sundry futile attempts to get a strap on it that would not interfere with the operation, and the electromagnetic method seemed to be the ideal one by which to accomplish such a purpose. As it would be impracticable to make a magnet of the table itself the logical conclusion was an extraneous device to supply the magnetism. The outcome of the experiments was the first practical magnetic chuck, built in the Norton shop in 1895.

The Magnetic Chuck a Success

The device was a success from the start. It required no argument to convince practical mechanics of its practicability; there remained only to combat the misgivings with which anything electrical was looked upon by people unfamiliar with electricity. Some were afraid that they might get hold of it in the wrong place and be killed; others were afraid of it on general principles, without being able to advance any reason for their fear. One man wrote Mr. Walker to ask if he could use the chuck in an iron frame building without danger of magnetizing the whole structure.

Everybody was afraid of magnetizing watch springs, and for this fear there was some justification for the early chucks were unquestionably leaky of magnetism. Watches were carefully put away before the wearer of one would approach the grinding machine and if anybody's watch should stop for any reason—even though there might be a piece of chewing-gum in the machinery—why! "the 'lectric chuck done it."

The First Commercial Chucks

Mr. Walker's first commercial business was with the L. S. Starrett Co. of Athol, Mass., who placed orders for several large chucks. These, though of considerably different construction than at present, were of the single-magnet type, literally as well as technically, for in a chuck 4 ft. long there was but one core and one coil, the latter wound in the shape of a flattened oval nearly as long and wide as the chuck.

After the coil was placed in these chucks and the connections made the chuck was finally closed by pouring the lead that separated and at the same time bound together the opposed pole faces. No thought was given to the possibility of repairs ever being needed and years after, when a ground developed in one of the original chucks and it had to be opened, the only way to accomplish it was to build a bonfire in the yard and melt out the lead; an operation which was, naturally, detrimental to the coil.

Many Difficulties to Overcome

Minor difficulties developed in course of the operation of the chucks; a condition to which all new devices and most old ones are subject. One of the first obstacles to be overcome was the general lack of a suitable source of energy for the chucks. Central stations were then the exception rather than the rule; many factories had no electric current other than that supplied by the lighting dynamos and these were seldom run except for an hour or two in the afternoon and a few minutes in the morning—sometimes not at all in summer. More numerous still were the shops that were without even this temporary supply. One of the first adjuncts, then, was the small generator that could be set up on a shelf, run by a small belt from the main line shaft, and left to take care of itself most of the time. Fortunately for the success of the chucks such machines were available and Mr. Walker made arrangements whereby a generator could be supplied with each chuck that was not otherwise provided for.

The Need for a Demagnetizer

Another trouble that demanded prompt attention was the permanent magnetization of all pieces of hardened steel that came in contact with the chuck. As over 90 per cent of the work handled in this way was of hardened steel the problem was not easy of solution. It was known, however, that by placing a piece of permanently magnetized steel in a rapidly alternating magnetic field and slowly withdrawing it the magnetism could be partially neutralized; and complete demagnetism had been effected by repeating this process in the sphere of influence of a solenoid through which was passed an alternating current.

As alternating currents were even less available than the direct, and as such alternating current machinery as was then on the market often generated as high as 133 cycles per second, Mr. Walker designed a machine to produce the necessary alternations mechanically.

The Walker demagnetizer, which will be explained in detail in the construction article on the Walker chuck, is a device which, by means of a revolving magnet, causes a rapid reversal of polarity in the exposed pole-faces of the machine and thus fulfills the required conditions. They are still built in large numbers, but are not so necessary as an adjunct to the chuck as they once were, partly for the reason that the 60 cycle alternating current, now so readily available, when passed through a solenoid is a practical demagnetizer for small work, but principally because in these later days a much larger part of the work handled on magnetic chucks is soft and therefore does not retain magnetism.

The Demagnetizing Switch

A means of counteracting the residual magnetism of the chuck was soon found to be necessary in order to release the hold upon large pieces of work. Such pieces would cling to the chuck face, even after the electric current had been cut off, with sufficient tenacity to make removal difficult and disagreeable, especially as such pieces usually had very sharp corners after grinding.

The answer to this problem was the reversing switch,

by means of which a current is momentarily applied in an opposite direction to that in which it has previously been flowing. A lifting stress being applied to the work, a touch of the switch blades upon the opposite contacts will release it instantly.

Another and more serious defect developed when the chuck began to be used as a factor in production. For toolroom use it was seldom required to hold pieces so small that they did not cover one or more of the non-magnetic gaps in the work-holding surface, and thus complete a magnetic circuit. In production work, however, a chuck might be covered with small pieces, many of which would rest upon but one polepiece and thus would be likely to be swept off when struck by the wheel; the momentum of the blow stripping all other pieces in front of it from the chuck.

This difficulty led to the endeavor to distribute the polepieces more widely over the holding surface by making individual pole-faces smaller and grouping them more compactly. The experimental room at the O. S. Walker Co.'s plant contains many experimental chucks and models, some of which are the subjects of the Walker patents while others are not patented.

Though all Walker chucks now on the market are of the single-magnet type it is not to be supposed that Mr. Walker did not recognize the possibilities of other types, as the model room discloses experiments with the multiple magnet type as well as many forms of independent magnets. Indeed, one of the experimental chucks, that was under severe and long continued service test in connection with the manufacture of a certain special machine part, is made largely of wood, only the magnets themselves being of metal. It was due more than anything else to the necessity for holding very small pieces and for changing them rapidly that competition developed in 1912; previous to which date Mr. Walker had the field to himself. Many and complicated were the devices constructed for this purpose; some by Mr. Walker and others by competitors. These will be discussed separately under the head of Auxiliary Devices.

The Growth of the Business

The first large chuck for the Starrett Co. was built in the Norton shops, and it was not until 1897 that Mr. Walker regularly began manufacturing. Working by himself at the Washburn shops his business soon outgrew his capacity to handle it alone, and he secured a place on Union St. on the second floor of a blacksmith shop, where he installed a few tools and employed two or three men to help him.

For three years the business grew slowly as the value of the chuck began to be appreciated by manufacturers, until it was necessary to secure larger quarters. The second shop was also on Union St., where after a few years of continued growth it occupied several floors and was doing a business that warranted building the present commodious plant at Greendale.

For some years Mr. Walker has been troubled by defective eyesight and in 1918 was compelled to retire from all active business. A new company was formed to whom Mr. Walker transferred all but a small portion of his holdings, which up to this time had always represented a controlling interest, built a beautiful new home in the residential part of the city of Worcester and settled down to enjoy life as well as a man suffering from such an affliction may; which, as he assures the writer, is quite well indeed.

He is far from being an old man, is in excellent physical health, and takes great delight in his garage, which he has fitted up with workbenches and a few electrically driven tools, where he spends many contented hours, known only to the master workman who has no cause to worry about the future, in inventing new things, mechanical and otherwise.

Though Mr. Walker is already well represented in the patent office, having nine patents on magnetic chucks alone, it is the writer's guess that he will again be heard from in other fields in the near future.

Cutting Metric Screw Threads on An American Lathe

By Archibald M. O'Brien

The interesting account by Chester Josselyn, page 120b of the *American Machinist*, which gave a very convenient substitute for the usual constant, 5:127, used in determining change gears for cutting metric threads, recalled to mind another constant used for the same purpose, which was described in a British publication some years ago and which the writer at once copied in his note book.

This constant or ratio is 63: 1,600 and has some advantages over 4½: 108 used by Mr. Josselyn; it gives results somewhat nearer the theoretical metric pitch, for example:

$\frac{63}{1{,}600} = 0.039375$ in. a plus error of only 0.000005 in. per milimeter, or 0.000127 in. per inch. This constant has the additional advantage of being very convenient to use in calculations, as will be noticed in the examples given below.

The method of finding the numbers of teeth in gears to be used for cutting any desired metric thread is the same as for either of the other constants, thus: Write the constant as a fraction and multiply by figures representing the threads per inch (single) of the lathe screw and the desired pitch in millimeters; the result will be the ratio of change gears required, provided that there is no permanent gearing between the lathe spindle and screw.

For example, to cut an 8-mm. thread on a lathe with lead screw of 4-pitch single thread,

$$\frac{63}{1{,}600} \times 8 \times 4 = \frac{63 \times 32}{1{,}600} = \frac{63}{40} \times \frac{32}{40}.$$

The figures above and below the line represent the driving and driven gears in the train.

Proof:

$$\frac{63}{40} \times \frac{32}{40} \times \frac{1}{4} = \frac{63}{200} = 0.315 \text{ in.}$$

Subtracting from this 0.31496 in. (8 mm.) we have a plus error of 0.00004 in. or 0.00032 in. in 8 threads.

To cut 2½-mm. pitch on a lathe with a screw of 2-pitch single thread:

$$\frac{63}{1{,}600} \times 2\tfrac{1}{2} \times 2 = \frac{63 \times 5 \times 2}{1{,}600 \times 2};$$

$$\frac{63 \times 10}{3{,}200} = \frac{63}{80} \times \frac{10}{40} = \frac{63}{80} \times \frac{20}{80}.$$

Proof:

$$\frac{63}{80} \times \frac{20}{80} \times \frac{1}{2} = \frac{63}{640} = 0.0984375 \text{ in.}$$

Subtracting from this 0.098425 in. (2½ mm.) we have a plus error of only 0.0000125 in. These results are very fair approximations, good enough for any but precision screw threads.

Reinecker Turbine Reduction-Gear Hobbing Machines

Three Large German Machines for Hobbing Gears Up to 19½ Ft. in Diameter—Traversing Hob Used

SPECIAL CORRESPONDENCE

THE increase in the use of high-speed steam turbines for ship propulsion has brought with it developments in the reduction gearing necessary to step down the rotor speed to that of the screw propeller. For the larger ships the helical and herring-bone gears have become so huge as to require special gear cutting machinery for their production. Several machines for this work have been built by J. E. Reinecker, A.-G., Chemnitz, Germany, and some of them are illustrated in the accompanying photographs.

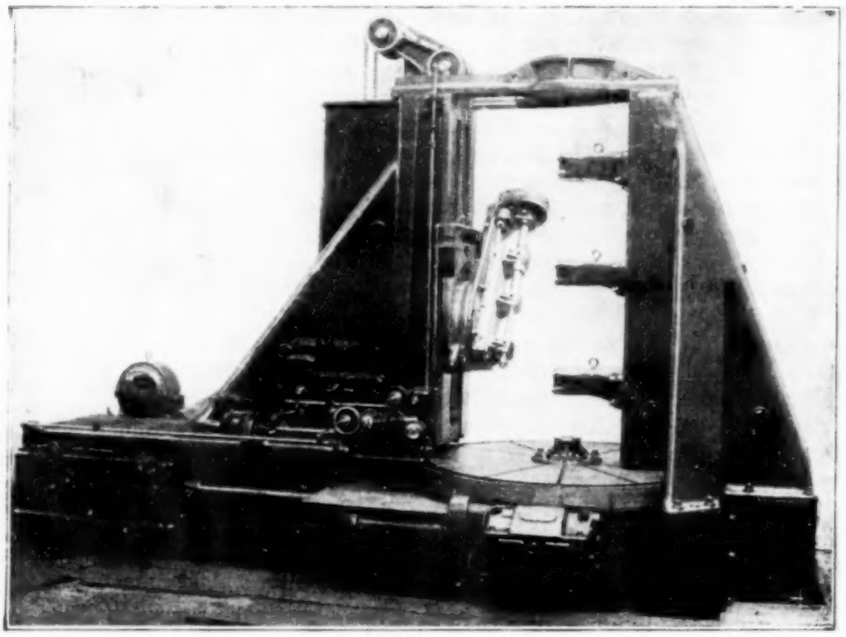


FIG. 1. REINECKER GEAR HOBBING MACHINE, FRONT VIEW

In Fig. 1 is shown one side of a machine built for hobbing gears up to 13 ft. in diameter and 6 ft. in width. The table, which will carry a load of 33 tons, has secured to it a large indexing gear cut as accurately as possible. The change gears of the indexing mechanism are at the extreme left of the gear box in the lower left-hand corner of the illustration. Both the main vertical housing and the counter-weighted saddle mounted on it are provided with hand and power mechanism for traversing and elevation respectively. The toolslide swivels on the saddle so that the hob may be adjusted to any desired angle.

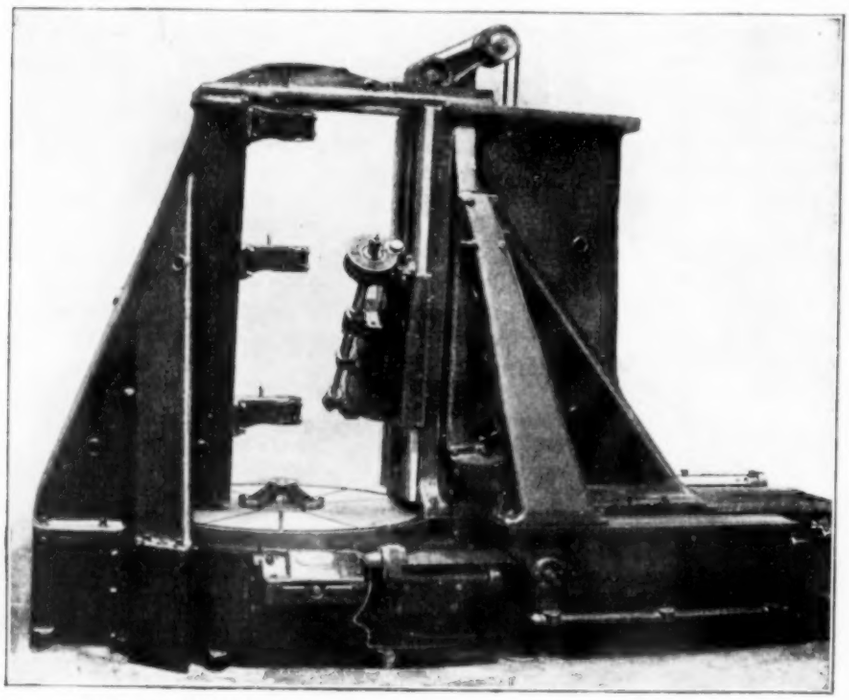


FIG. 2. REINECKER GEAR HOBBING MACHINE, REAR VIEW

A novel feature in the operation of the machine is that there is a continuous transverse movement of the hob while it is in action so that the full cutting width is in service and wear is practically uniform. The change gears at the foot of the vertical housing regulate the travel of the hob.

Tooth depth is governed by traversing the vertical housing, which is fitted with a vernier scale for close adjustment. Two worms located at opposite sides of the machine are used for indexing. One worm has transverse adjustment, while both worms are adjustable for depth of mesh.

The Table Thrust

The revolving table is mounted on a spindle that rests on a large thrust bearing and is further supported and guided by a beveled ring of large diameter. A relieving device consisting of a heavy lever is located beneath the table support so that the height of the table can be adjusted for varying loads by taking up the end thrust. The table spindle is hollow so that work mounted on a shaft can be taken care of. The motor is located at the rear of the massive bed and, as may be seen, is mounted on the box containing the

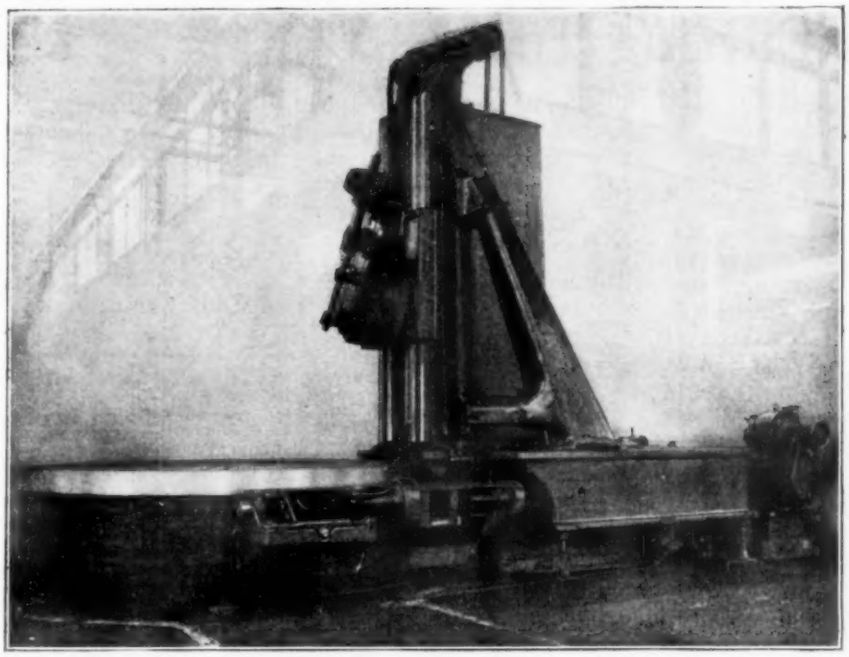


FIG. 3. GEAR HOBBING MACHINE FOR 19½-FT. GEARS

driving gears. The gears run in an oil bath. For heavy work an auxiliary upright supported on a separate bed is used to stiffen the main vertical housing. The support and bed are seen at the center and right in Fig. 2.

When it is desired to cut pinions a third upright, seen at the left in Fig. 2 and at the right in Fig. 1, opposite the main housing, is mounted on an extension of the base. When the cutting depth has been adjusted the two housings are locked together at the top by a horizontal cross-piece.

Fig. 3 shows a larger machine of the same type which can handle gears up to 19½ ft. in diameter and 6½ ft. in width, and weighing up to 95 tons. This machine is not fitted to cut pinions.

In Fig. 4 is shown a large horizontal pinion-hobbing machine built on the same principle as the other machines illustrated.

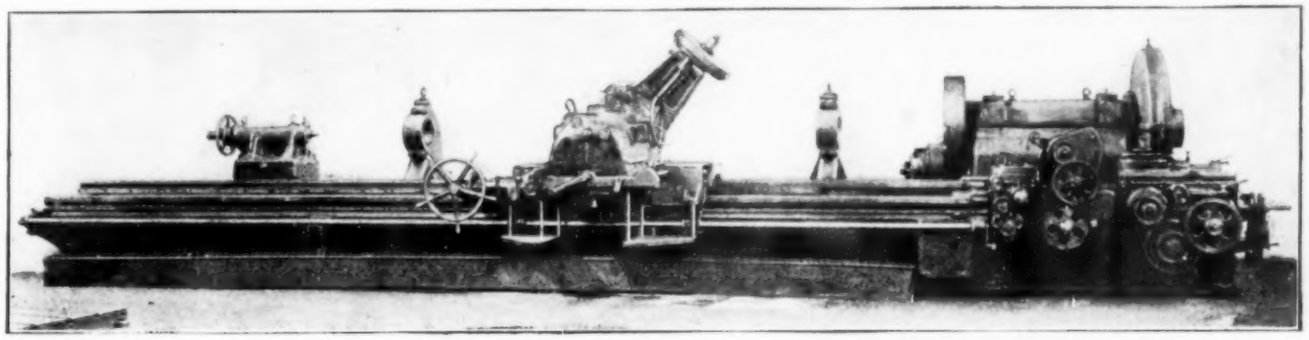


FIG. 4. PINION HOBBING MACHINE

The Cost of Unnecessary Service

BY JOHN R. GODFREY

On page 237 of the *American Machinist*, S. O. Livingston voices a grievance which is well worth considering at this time—or any other. Doesn't it show that we have overplayed the "service" game in many particulars? And is it not fair to ask why the man who never asks for service, either because he does not need it or because he does not know he needs it, should pay for the unnecessary and unreasonable demands of a few? For every dollar spent in this way has to be paid for by the customers of the machine.

I'm a great believer in "service" in many cases. When I'm fortunate enough to drive "Lizzie" off for a day's run in the summer, or maybe a week, I like to have the battery service station man look at my battery, give it a drink if necessary and tell how its blood pressure is. But I'd much rather have him charge me a fair price for his time—and the water—because tipping is bad enough in hotels, and he wouldn't expect it from a "Lizzie" driver anyhow. In the same way I'd much rather pay a small fee for "free air" than to try and think of something to buy so I won't look like a piker. I use the "free air" because I'm too lazy to pump it by hand, but I'm willing to pay for it. As I said before, I'm a believer in service but I believe it ought to be sold instead of given away. Of course in reality it is sold but the wrong man pays for it. I mean sold—as a paying investment—to the man who needs it.

Automobile service stations give a regular service at so much per month. Typewriter and adding machine companies do the same. Why not learn a lesson from them? Why not put some of our salesmanship into selling service—as well as the machine itself?

If I already have your machines in the shop and send a wire for two more machines, you are at no selling expense in this deal. If I do not need service, or don't know I need it and so don't ask for it, why should I pay for something I don't get?

There has been too much free service given. We all know cases where makers of machines have done a hundred or more dollars worth of engineering work for supposedly prospective customers who had no intention of buying a machine. What they wanted was suggestions which they could use on other machines of a similar type, or to know how such matters were handled by others. Of course you had a perfect right to do this, but I helped pay for it in the price of the machine I bought. That's what I'm kicking about.

Isn't it time to get the selling of machine tools on a more business-like basis? Isn't this free service one of the first things to go after?

Metal Cutting Tools—V*

(Continued from last week's issue.)

BORING tools may be divided into two classes: Single and multiple tools. The single tool is either made in one piece, or is a tool inserted in a holder. In jobbing shops, toolrooms and so on, the single boring tool is often made of a piece of round stock forged down and given the proper shape at the end by forging and grinding. A tool of this nature is generally clamped in the toolpost of the lathe and the toolpoint is brought to center by packing under the shank. The proper positioning of the toolpoint depends entirely on the skill of the operator. In order to have proper working angles with a relatively large amount of variation which will necessarily be met under these conditions, the tool-point must have a small contained angle and becomes weak and unfit for heavy cuts. On the other hand if a holder is used it is generally provided with some flat surface which will locate it square in the toolholder, and make it possible to grind the tool to a given height, so that it is easier to set a boring tool to the proper position with an inserted tool than with a single tool.

The O. K. Boring Toolholder

Fig. 78 shows a boring toolholder as manufactured by the O. K. Tool Co. This holder can be placed in the toolpost of a lathe and assures to a certain extent the correct setting of the tool; that is, the toolholder cannot swivel around its axis. If the toolbit is properly ground it will naturally present the proper angles to the work. On the other hand the height of the tool is not determined by the holder but must be readjusted after every grinding or setting. Figs. 78, 79, 80 and 81 show various types of boring toolholders as made by the O. K. Tool Co., the Lovejoy Co., J. H. Williams & Co., and the Ready Tool Co. In all these cases the tools are held in round bars and the round bars in their turn are held in square shank toolholders, so that after grinding the tool and placing it again in the boring bar, it will present the same angle to the work as it did before grinding, and only the height will have to be adjusted—just as in the O. K. square shank toolholder described above. But if it is necessary to move the round bar in the toolholder in order to bore a deeper hole, this adjustment of the angles of the tool is disturbed.

The most common multiple tool is the double-end boring tool, which is merely a plate of steel ground to the proper angles, and held in a slot of the boring bar. The tool is made in a great variety of ways, but its essential features are that it has two cutting lips and that it can readily be removed or inserted. Its main requirement, in common with all multiple boring tools, is that both lips should do an equal amount of work. In order to do so, the two lips must be in one plane at right angles to the axis of the boring bar, or to be more correct at right angles to the direction of the feed. If the boring bar is supported at its far end it will also be necessary to have both sides of the tool at equal distances from the center of the boring bar so that each half of the tool shall bore to the same diameter. But if the end of the boring bar is not supported, then a small difference in the diameter of the two cutting edges would not materially affect the result as the boring bar will naturally assume a position which divides the cut evenly. If a single-point

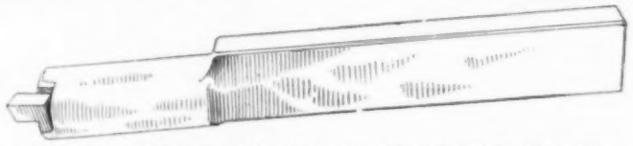


FIG. 78. BORING TOOLHOLDER MADE BY THE O. K. TOOL CO.

FIG. 79. BORING TOOLHOLDER MADE BY LOVEJOY CO.

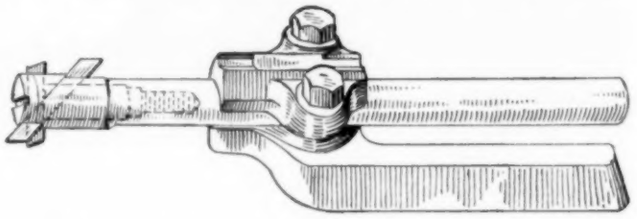


FIG. 80. BORING TOOLHOLDER MADE BY J. H. WILLIAMS & CO.

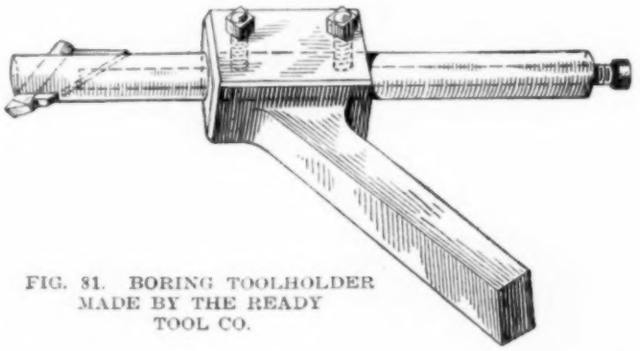


FIG. 81. BORING TOOLHOLDER MADE BY THE READY TOOL CO.

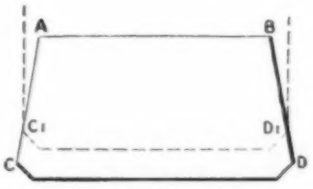


FIG. 82

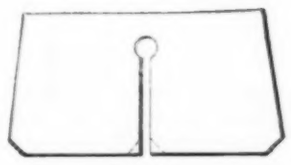


FIG. 83

FIG. 82. DOUBLE-END BORING TOOL. FIG. 83. SLOTTED DOUBLE-END BORING TOOL

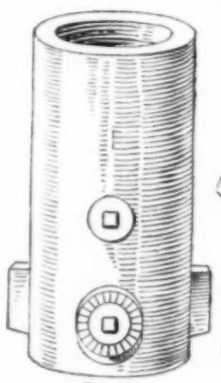


FIG. 84

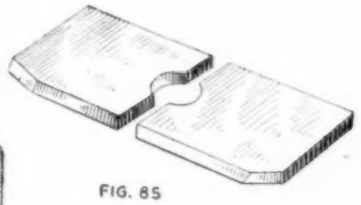


FIG. 85

FIG. 84. DAVIS BORING BAR WITH TOOL IN PLACE. FIG. 85. DAVIS BORING CUTTER

*For the author's forthcoming book. All rights reserved.

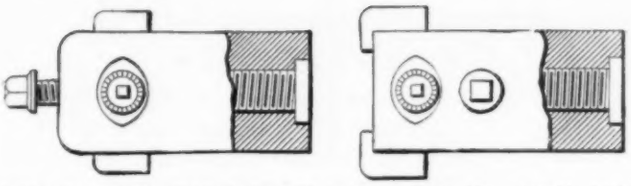


FIG. 85a. GENERAL UTILITY TOOL. FIG. 85b. TOOL FOR BORING BLIND HOLES

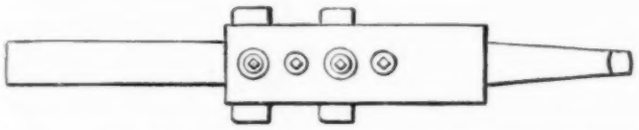


FIG. 85c. COMBINATION ROUGHING AND FINISHING TOOL

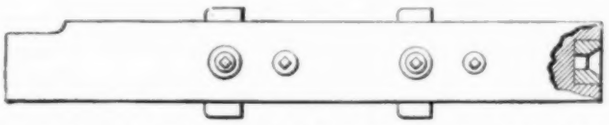


FIG. 85d. SAME TOOL AS 85c. WITH CENTER INSTEAD OF PILOT

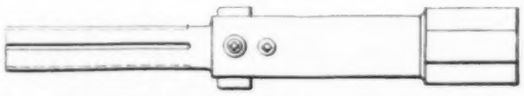


FIG. 85e. TURRET LATHE TOOL WITH STRAICHT PILOT

FIG. 85f. TAPER SHANK TOOL FOR BLIND HOLES. FIG. 85j. TOOL TO BE SUPPORTED BY JIG BUSHING

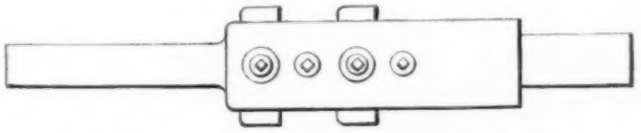


FIG. 85l. TOOL FOR TWO-DIAMETER WORK IN TURRET LATHE

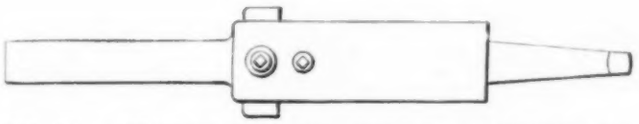


FIG. 85n. PILOTED BAR FOR DRILLING MACHINE USE.

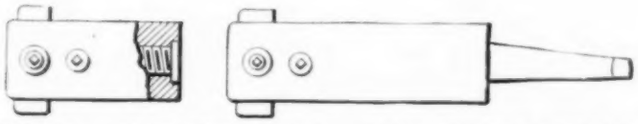


FIG. 85o. TOOL FOR BORING BLIND HOLES WITHOUT BOTTOMING. FIG. 85q. DRILLING MACHINE TOOL FOR BLIND HOLES WHEN BOTTOMING IS UNNECESSARY

FIG. 85p. PILOTED BAR FOR TURRET LATHE WORK

tool is used, in a round (cored) hole, the deflection of the tool will be greater when it meets a larger amount of metal to be removed, and consequently the axis of the hole follows some curved line, or, as it is generally expressed, the boring tool follows the irregularities of the hole. This following of the hole is minimized when a double-end tool is used, because if one side of the tool is deflected on account of the heavy metal it meets, the other side of the tool will be pushed into the metal and will be compelled to take a heavier cut. Even at that the double end tool will also follow the hole, but the curved line of the axis of the hole will be very much straightened out.

Objection to the Double-End Tool

The main objection to the double-end tool is that it loses its size. In order to have side clearance, it would have to have a shape such as shown in Fig. 82, in which AB is shorter than CD (very much exaggerated). When the tool is ground as far as the dotted line, the line C_1D_1 will be shorter than the original side CD. For this reason, double-end tools are quite often made as shown in Fig. 83. A slot in the tool permits a screw with taper point to expand the tool to its proper size. When this method of keeping the tool to size is employed, it is more necessary than ever to grind the tool while it is in the boring bar in order to make the two lips perform the same amount of work. The various makers of small tools and, for that matter, various individual manufacturing shops, have elaborated on the double-end tool and have given it adjustable features. Fig. 84 shows the end of a Davis boring bar with the tool in position and shows its adjustable feature. Fig. 85 shows the cutter itself, which, as will be seen, consists mainly of two individual cutters held in position by a wedge. Where such a bar is used with a pilot, it is advisable to grind the tool in position in the bar. For a stub bar, it is generally satisfactory to grind the tools to a gage and then place them in a bar. The following arrangements of such a bar are recommended by the Davis Boring Tool Co. for the following operations:

See Figs. 85a, b, c, and so forth.

Recommendations of Davis Boring Tool Co.

85a is the ordinary boring tool which is threaded onto a spindle or onto a special shank or fixture or adapter to connect it with the spindle. It is a general utility tool which can be used for a number of various purposes and on a number of various machines.

85b is a modification of the previous tool specially adapted to boring blind holes.

85c is a combination tool containing a roughing and finishing blade, spaced a sufficient distance apart to let the cutting edge of the roughing blade clear the rough bored hole before the cutting edge of the finishing blade starts to work.

85d is a similar combination tool, but whereas 85c has a pilot, 85d has a center. As the tool is shown, it would be adapted to be held between centers of a lathe and to be driven by means of a dog while the work could be held on the carriage.

85e is particularly adapted for a turret lathe where the boring bar can be piloted in the spindle.

85f is for the same purpose as 85b, but whereas this latter tool was a general utility tool, 85f has a shank which limits its application to those machines which have the proper taper. 85b would be more use-

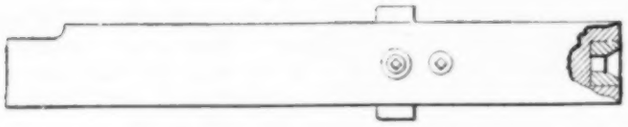


FIG. 85r. SINGLE-CUTTER TOOL WITH CENTERED END

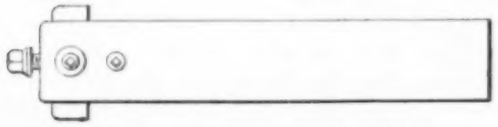


FIG. 85t. BORING MILL TOOL

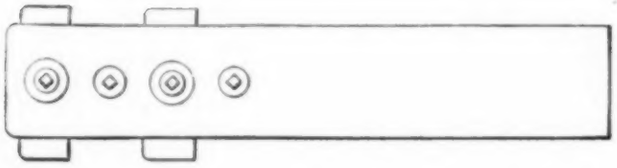


FIG. 85u. TOOL FOR TURRET LATHE WORK WHERE PILOT CANNOT BE USED

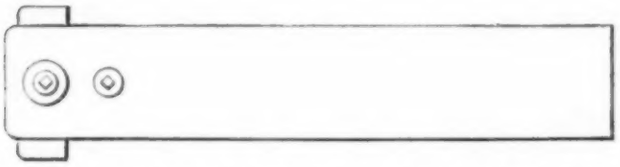


FIG. 85v. SINGLE-BLADED TOOL OF SAME TYPE AS 85u

ful where a variety of jobs has to be done, whereas 85f is of greater value for manufacturing purposes.

85j is a tool which is supposed to be supported in a jig bushing.

85l is an arrangement often used for turret lathe for two diameters or for one diameter and counterbore.

85n is a piloted bar with taper shank well adapted to drill presses, and where the bar is guided in a fixture.

85o is a compromise between 85a and 85b. It is adapted to boring blind holes, but without bottoming.

85p is built along the lines of 85n, but its shank makes it specially adapted to turret lathe work.

85q is especially adapted for drill press work of the same nature requiring 85o, but the bar is longer and adapted to a greater range of work.

85r is of the same type as 85d, but using one tool only.

85t is well adapted to boring mill work such, for instance, as car-wheel boring, etc., and where a standard hole has to be reproduced frequently. This tool is often arranged with two blades, one for roughing, one for finishing.

85u is particularly adapted to turret lathe work where a pilot cannot be used.

85v is of the same general arrangement as 85u, except that it is shown here with only one blade.

The above tools are shown particularly for the purpose of demonstrating the great variety of arrangements of boring bar and tools in actual use. There are many other arrangements used in practice, depending on the nature of the work to be done, and the nature of the machine on which it is to be done, whether the tool is to be used for general purposes or for special jobs, on the degree of accuracy required, and on a variety of other considerations.

Educating Workers in the Plant

BY FRANK H. WILLIAMS

When a plant needs more skilled workers than it has, should it go outside for them or educate some of its employees to handle the higher positions?

Of course the answer to this question depends quite largely upon the plant's immediate needs. If it requires more skilled workers at once and simply must have them, then, of course, it will be necessary to bring them in from the outside. But, if the plant executives can foresee a need that will develop within a comparatively short space of time, then it would seem as though the best plan would be to educate some of the workers employed by the concern at present to hold down the more responsible jobs.

There are a number of reasons why the latter plan is better than importing new people. In the first place, those workers who are already familiar with the plant and with some of the activities for which they are to be educated will probably take hold of the new work very readily and not "flivver" on the job, as some outsiders are very apt to do. Consequently, the expense of hiring and firing the newcomers will be entirely done away with. Again, the workers who are educated by the plant for higher jobs will be sure to give the concern the best sort of loyal service. Also, the bringing of men up from the ranks will engender a fine feeling toward the company among all the employees. Finally, such workers are certain to fit into the organization with less rumpus and disarrangement of schedules than will outsiders.

AN EDUCATIONAL PLAN

The fact of the matter is that the plan has so many advantages that the comparatively small expense involved in conducting the necessary classes should not deter the majority of plants from putting the plan into effect, whenever possible. In most cases where this sort of a plan has been adopted, the employees take great interest in the matter. For instance, the Fort Wayne Electric Works of the General Electric Co. recently started a business course, including accounting and law, for those employees who showed enough interest in the matter to attend the classes. No hope of promotion was held out to those attending the classes, but it was stated that the employees who took the course would better understand the company's methods, as well as receive a general course of study which would make them more efficient in all accounting work.

At the first session of the class eighteen employees were enrolled. The class meets every Monday and Wednesday evening from 5:45 to 7:45 o'clock and, in addition to the regular class periods, the course contemplates from eight to twelve hours home study each week. The course is divided into five semesters and extends over a period of two and a half years. It is, of course, offered free to employees of the company who are interested in work of this nature.

Naturally a man has to be pretty ambitious to do so much extra work every week along the same lines as his regular daily occupation. Naturally, also, the company will look to the members of this class when it is seeking men for higher positions in its accounting department. Such a plan of study might not be adaptable to smaller plants, but it should go well in all larger plants and tend to work a very real advantage. A plant manager may well consider this matter at present, so that needs may be met when they arise in the future.

Meeting the Present Emergency

BY A BUILDER OF MACHINE TOOLS

I HAVE an abiding faith in our country and its resources, and especially is my faith strong in the great body of men who are responsible for the industrial welfare of our country. As soon as the multiplicity of perplexing problems now confronting the country can be analyzed and properly classified, business will resume.

Just now we are suffering from mal-assimilation, due to the malformation of the automotive machine-tool and textile industries and a few others, together with malformation of administrative organization, which has added increasing taxation to industry. All of these have resulted in producing a case of general nervous prostration.

There has been much price inflation, too much for easy adjustment now, and general business will not be resumed to any appreciable extent until the cost of raw materials is brought to a more nearly normal pre-war basis. This, of course, is equally true of the prices of fabricated materials in all lines, as well as to labor costs.

I firmly believe that we have got to get back to pre-war normal conditions and adjust upward from that level, rather than to adjust downward from the present levels to what may appear to each individual producer as a good, safe guess.

The quicker we all realize that the war is over and get back to first principles and make a new start the sooner will business revive. This will require united action, and it must be with the co-operation of labor. Prices cannot be brought back to pre-war normal without very substantial reductions in the cost of labor. In fact all industry is suffering from a very aggravated case of "inflationitis" and it will take some very bitter medicine to restore a healthful condition. But the medicine must be taken no matter how bitter and the sooner we all realize this and swallow the dose the quicker we will get the taste out of our mouths and get back again to safe industrial conditions.

In our own case we are operating on our regular schedule of fifty hours per week, and have not found it necessary to curtail our working force. We could handle more business, as our orders are not so large in volume as we might wish. But our stock was so entirely exhausted during the war period that it now affords us an opportunity to replenish it, which is most desirable.

The automotive industry has been very largely over-expanded. Its shrinkage will be painful to many lines of industry, in fact it cannot help but effect most seriously the entire industrial system of the country. But I look for greater development in the automotive trade through a wider and more general use of the motor truck, the tractor and also in a much further development of the airplane.

I firmly believe that no 5, 10 or even 20 per cent reduction in prices that have, during the past four or five years, been advanced to 180 per cent or 200 per cent and beyond, will ever stimulate trade. The operation is bound to be a painful one, it will be bitter medicine, and the quicker it is over the better for all concerned. But the inflation must be taken out of prices, and we will have to get back as nearly as possible to pre-war conditions as a basis from which to make a new start, and then adjust upward from that level as may be found necessary in each individual case to meet changed conditions.

BY AN EASTERN SALES MANAGER

IN A sense, the present situation is one which can be viewed as an opportunity for industry. Unquestionably, industry today is getting a much-needed overhauling, and when we have passed through these unpleasant times we will find ourselves on a much healthier basis. To us now, of course, the process of readjustment is unpleasant and difficult. We are bending every effort and devoting all of our energies at this time to conservation of resources, eliminating all unnecessary expense.

Building for the future in these times is a most important item. The promotion of sales propaganda through sales engineering work should be indulged in to whatever degree the treasury can stand, and the development of new types of machines and equipment for future demands goes without saying. The particular need in this line is for machines that will effect economies in production.

Many small concerns were established on insecure foundations that were possible because of the unusual trade conditions prevailing in the past four years. They had no rational future plans and built up no reserve. Business will be reduced to those companies who have established themselves on a firm and healthy basis, the standard makes of this country. Concerns who have sprung up over-night will undoubtedly be eliminated.

CULTIVATE OTHER FIELDS

While the automobile industry is slowly resuming its place as the biggest consumer of machine tools, other fields must be cultivated by the machine-tool builder. There is no single industry to which he may turn, but there are many lesser ones in which modern tools should replace home-made and worn-out machines in order that they may survive the period of keen competition into which we are entering. The tool builder thus finds a market, and the manufacturer of consumption goods is enabled to reduce his cost of production to a profitable basis, even at the lower retail prices which are certain to prevail.

At present the shelves of manufacturers would not indicate an immediate return of buying, but now that the first of the year has passed the immediate needs will have to be supplied and for a short period there may be a brisk return to buying. When this has passed there will be another lull, and not until summer or into the fall shall we commence to feel the first of the demands of this country. Present conditions will naturally eliminate from consideration any great amount of export business.

This is probably the first time in history when business depression has been simultaneous in Europe and at home. During other seasons of stagnation the foreign market has been a relief into which over-stocks could be shifted. Present exchange barriers prevent this trade and we must await the completion of the domestic cycle of over-production, under-consumption, stagnation, resumption of buying, and manufacturing activity.

A Question in Factory Management

By L. L. Thwing

Mr. Forbes' solution of his snagging problems, as told on page 865, of *American Machinist*, by the use of "Tech" students suggests several things. For one thing, fifteen years ago a "Tech" student was commonly understood to be an undergraduate of one of the large technical schools. Today the phrase may mean a student of a technical high school, or even of a correspondence school. However, any such "Tech" boys may be assumed to be more apt in learning the duties of a machine operator, and the very fact that they are alert and intelligent accounts for the accurate observation by Mr. Forbes that they are very likely to make what appears to be very inexcusable mistakes; mistakes that are not generally made by boys of a more stolid temperament.

If you put a boy with an alert mind on a monotonous repetitive job that requires but a small part of his attention you may be sure that sooner or later the larger part of his mind will occupy itself with more interesting thoughts, and as a result he has helped to increase the scrap pile. On the other hand it is not at all impossible that he has done more work, or better work, than his neighbor, and this might be enough to offset the loss in the piece that he spoiled. There are any number of managers, superintendents and chief draftsmen who would make highly unsatisfactory snaggers or polishers.

Technical Graduates in Demand

There seems to be a place—even a demand—for technical graduates at the snagging bench and the drilling machine and again in the superintendent's or shop manager's chair. We see a good many enter at one end of the tunnel and very few come out. The process of working up to the shop manager's chair seems to be not only a difficult one, but one whose processes have not been closely examined.

It may be assumed that any boy who selects a mechanical course in a technical school has done so because he is at least interested in mechanical problems, and it is not entirely unreasonable to assume that if he likes mechanics and mathematics he is somewhat proficient in them. We are more likely to enjoy doing those things that we do well. He certainly did not choose a technical school because it was easier than a college; and after he has spent four years in school and is ready to put his foot on the lowest rung of the ladder of professional success he is likely to find that rung, or at least the second or third one, guarded by a thoroughly capable graduate of the college of hard knocks who defies anyone to mention to him a single great invention that was made by a college graduate.

We are graduating many mechanically trained men each year; men whom, we must assume, have at least a certain amount of foundational training that the shop educated man does not have. If we are to admit that technical schools are good for anything, we must admit that their graduates are, on the whole, better material for the future superintendents of our machine shops than any other class of men. But how many arrive? How many even stick to mechanical or engineering work? If we assume that 50 per cent of the graduates do not have those qualities which make for success along mechanical lines, and if we allow for 25 per cent more to have been side tracked by those intangible and uncontrollable forces which may be grouped under the general heading of bad luck, we still have 25 per cent left. We know that 25 per cent of our "Tech" graduates do not find executive or professional work along mechanical lines at the climax of their struggles, and we may strongly suspect that not 25 per cent of our mechanical engineering graduates are working in mechanical lines, even if we stretch the word mechanical to its full elastic limit.

One reason for this condition is the fact that engineers appear to be in great demand for everything except recognized engineering problems. Consequently we have sales engineers, efficiency engineers, publicity engineers, and even "correspondence engineers."

Value of a Technical Education

Some years ago the writer happened to be in an office where several technical graduates were pessimistically reviewing the direct value of a technical education. The experience of nearly all of them had been that they were accepted readily as common and unskilled laborers, at smaller pay, however, and they worked with varying degrees of patience until, seeing no chance for advancement, they quit. One group of five had secured a "chance to work up" with a large steel corporation, and were assigned to the job of straightening steel plates with a 15-lb. sledge, varied occasionally by a turn with the red paint. At the end of a year there was one of the group sticking to the job. According to the copy book maxims he should be chief engineer of the plant by now.

One other had been head of the steam engineering department of a large engineering corporation, and as such laid out the entire piping system for both power and heating for what was then the largest woolen mill in the world. His salary was $25 a week, and he left to go into the insurance business.

Facts and Platitudes

It is very easy to give specific reasons in individual cases, why men have not worked themselves up to positions of responsibility and trust in their chosen field, and very easy to deliver a few platitudes about hard work, patience and stick-to-itiveness, but the problem is deeper than that. This country has been a place where results count, and methods have not been scrutinized. If a man cut a worm in the lathe by trying different gears until it was "near enough," he was just as good a man as the one who could figure out what these gears should have been. He did the job and that was what was wanted. I do not believe that there is any advantage in having engineers at the head of engineering companies, though it is customary to do so in England and Germany. The writer was employed by the Alien Property Custodian during the war and consequently saw much of the German-owned and managed industries; in nearly every case the man next in authority to the manager was an engineer.

The question of why our technical graduates do not succeed to any considerable extent in technical work is too large to settle here; it involves the question of the vital qualities for success in any calling. If it is, however, a fact that the students whom we have trained to handle our mechanical problems are not doing it, either something is the matter with the students as a class, something is the matter with their training, or something is lacking in our system of recruiting, training and selecting executives.

Lack of Standardization of Pneumatic Hammer Chisel Shanks

By A. J. Schwartz

A short time ago it became necessary for a manufacturing firm to procure, by purchase, a large supply of pneumatic hammer chisels. Heretofore this firm had been making its own chisels and had an expert mechanic to fit the shanks of the chisels to one of the hammers in use. With the workman's experience and good judgment the firm was able to get along with a fit of the chisels in the hammers that gave fairly good results. This firm is, however, in the throes of a change, from a "Go" gaging system, to a system requiring "Go" and "No Go" gages. Therefore, a set of "Go" and "No Go" gages were ordered designed for the shank ends of the chisels, so that any person could inspect these tools.

Right here is where trouble developed. How much allowance should be required and how much tolerance should be permitted for these tools? What was the practice of the commercial firms regarding their dimensions? Hand books, periodicals and catalogs were consulted, but none gave, for a given size of hammer, the internal dimension of the socket or nozzle, and while data are given in the catalog for the size of the chisel shanks, there was no uniformity in these dimensions. The policy of the minimum hole basic as a standard has been adopted by this firm, therefore the socket was taken as a standard.

Having decided upon the minimum dimensions for the socket, the next question was to decide upon the

	Round Shank	Hexagon Shank	Differential Shank
Navy Department	0.495" Specification 40-T-2	0.580" 0.680" Specification 40-T-2	Specification 40-R-2 0.580±0.001" 0.680±0.001"
Navy Department	0.495±0.001" Specification 40-B-4	0.580±0.001" 0.680±0.001" Specification 40-B-4	0.580±0.001" 0.680±0.001" Specification 40-B-4
First Manufacture	0.497"	0.597" 0.660"	
Second Manufacturer	0.500	0.590" 0.680"	0.590 0.680
Third Manufacturer		0.580" 0.682"	0.580" 0.660"

COMPARISON OF SPECIFICATIONS FOR PNEUMATIC HAMMER CHISEL SHANKS

maximum size of the chisel shanks and the minimum allowance and then decide the greatest minus tolerance that would permit the proper functioning of the hammers. The sketch shows the result of a search of circulars and catalogs for the shank dimensions. Note how varied the dimensions are for a given size chisel.

It will be seen that only the Navy Department specifications state permissable tolerance. However, exceptions are taken to these tolerances; with an allowance between the maximum shank and the minimum socket of over 0.01 in. the tolerance of only 0.001 in. is considered to be entirely too small. Also as the Navy Department specifications were prepared for the use of the different bureaus in purchasing material, these same specifications would prevent, when "Go" and "No Go" gages were used, any commercial manufacturer supplying the government with chisels taken from stock. It would be necessary for the manufacturers to grind the shanks to meet the special requirements of the government specifications.

A Step Toward Standardization

The appeal is now made to all firms manufacturing pneumatic hammer chisels, to call a meeting for the purpose of standardizing the shanks of chisels and also the internal dimensions of the sockets or nozzles of the hammers, specifying in particular for any given size of hammer the smallest amount of allowance and the largest clearance (allowance and tolerance) that will permit the proper assembling and functioning of a pneumatic hammer, that is, the minimum dimensions with a plus tolerance for the socket and the maximum dimensions with a minus tolerance for the chisel shanks.

The following dimensions should be standardized for any given size hammer: There should be specified a uniform length and tolerance for the total length of the shank whether round, hex or differential; a uniform diameter and tolerance for the large round on the hex and differential shanks; a uniform size and tolerance for the dimensions of the hex; a uniform diameter for the small round on the differential shanks; a uniform dimension for the radius where the shank joins the chisel body. And last but not least the two diameters on each of the differential and hexagon shanks should be co-axial.

Cases are known where it was necessary to make new sockets and ruin a new chisel due entirely to the axes of the two parts of the shank not being exactly co-incident. If it is impossible to keep these parts in perfect alignment then the tolerance on this point should be within the smallest limits possible for commercial production and with the absolute guarantee that the chisels will function properly and not cause any trouble to the purchaser.

Press for Making Paper Tags

By George G. Little

While reading Vol. 49 of the *American Machinist* I saw on page 498 an article illustrating a punch press of unusual design. In the article the statement is made that the maker believes it to be the first instance of operating piercing and blanking dies by pulling the dies down by power applied from beneath.

It is my opinion that the principle of moving the upper head and the punches through the medium of vertical side bars, is old and has been used before though not so common as the overhead crank. In shoe factories I have seen the sole and heel dies forced through a sheet of leather by a press having side rods and an upper head that was pulled down onto the dies.

A Special Press

In 1911 I designed and built a small punch press especially for the purpose of piercing and blanking out the paper tag, shown in Fig. 1, and as far as I know this is the first instance of a press being built to operate pillar dies, having the crank below the platen. It was my intention to develop the design for the market but owing to other more important work it was not carried out. In Fig. 2 is shown a front view, part section, of the press mounted on top of a cabinet. In Fig. 3 is shown a cross section through center of machine and die. The pillar presses are of cast iron 2½ in. square and 2½ in. high, with ½-in. cold rolled steel guide

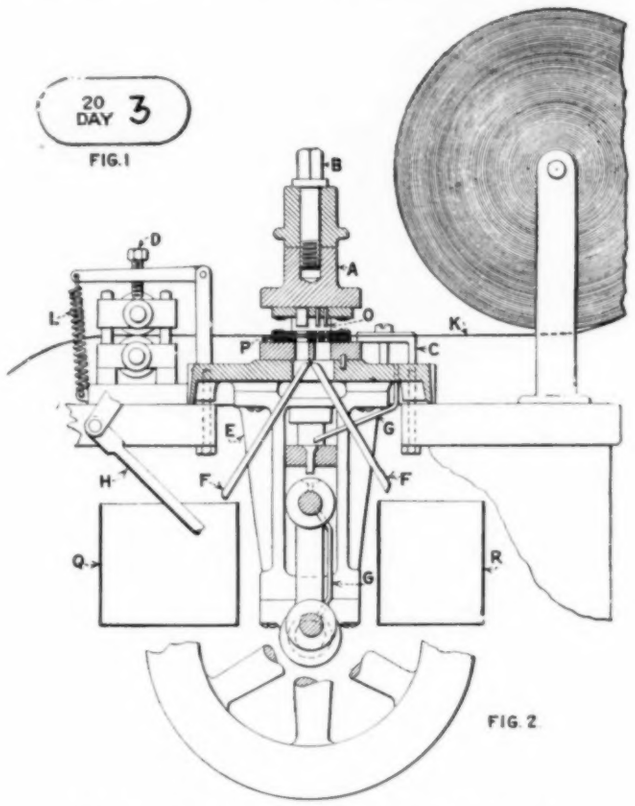


FIG. 1. THE TAG. FIG. 2. FRONT OF PRESS

pins. The cap *A* is secured to the crosshead of the press by the shoulder screw *B* while the base is secured to the press platen by two clamps one of which is shown at *C*. The dies are made of cold rolled steel ¼ in. thick by 2 in. square, finished and case-hardened. The punches are of drill rod finished and left soft, mounted in punch pads of cold rolled steel ⅜-in. thick by 2 in. square. The dies *P*, together with the stripper plate and guides, are secured to the pillar press base by four screws and dowel pins, as is usual in progressive dies. The pillar press is located on the press platen by two dowel pins before being secured by clamps *C*.

Feed rolls pull the paper strip through the dies and are actuated by a roll-grip clutch (not shown) having six drill rod rolls ¼ in. diameter and ½ in. long, sup-

ported by hard steel plates made by hacksaw blades secured in the rotor. The ring or outer shell of the clutch is of cold-rolled steel not hardened. This clutch has given several years of service without requiring repairs and was still in use one year ago. The spring *L* through adjustment of the screw *D* gives the proper tension for pulling the paper without slip. An eccentric on the crankshaft times the action of the rolls by means of the rod *H*, Figs. 2 and 3. The lower crosshead *I*, shown in Fig. 2, is guided by the side members of the drop frame *E*.

The vertical side rods *S* work in the guides *T* which are a press fit in the platen, the rods being threaded at the upper end to furnish a means of adjustment of the stroke which is secured by setting the collars *M* and the top nuts *V*.

The chutes *F* and *F* in Fig. 3 are for the purpose of carrying the piercings into the box *R* while the finished blanks go into the box *Q*, the separating being entirely automatic. The paper *K* is 1 in. wide and the blank is ¾-in. long, leaving ⅛-in. margin in the scrap with the same amount between the holes. The pitman

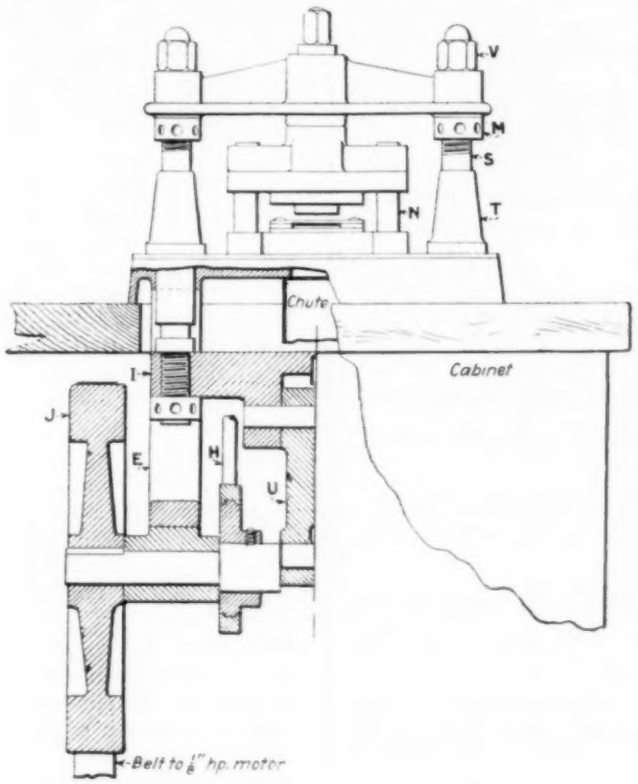


FIG. 3. CROSS-SECTION THROUGH CENTER OF PRESS

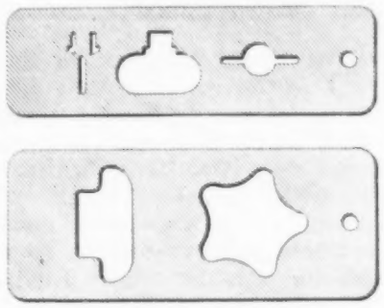
U, Fig. 2, is of cast iron as are the upper and lower crossheads, the drop frames, platen, balance wheel and crankshaft bearings. The balance wheel serves as a pulley being slightly crowned and the belt passes down to a ½-hp. motor. Oil is supplied to the proper points through tubes leading from a row of cups located at one side in the base of the press as indicated by *G*, Fig. 3. The crankpin receives oil from the upper wrist-pin supply. A 12-in. roll of paper makes 27,000 tags and, at six tags per second, takes one and one-quarter hours to cut.

The tags are used for marking surgical ligatures and are inserted in the glass tubes in which ligatures are sealed.

Drawing Room Templets

By John L. Braun

In large drawing rooms where jig and fixture drawings are made, certain standard parts are used, such as knobs and thumbscrews. Sometimes it is desirable to show these parts in the drawing in order to indicate a certain amount of clearance required and the method of clamping. The templets shown are used to draw these parts in place and can be made of celluloid or metal about 0.03 in. thick. If made of brass, and nickel-plated, they will be very durable and probably last longer than if made of some transparent material. The edges are generally beveled to facilitate picking up. These templets cannot fail to save time where finished drawings of jigs and fixtures are made. The illustration shows templets for a ¾-in. thumbscrew and No. 2 knob.

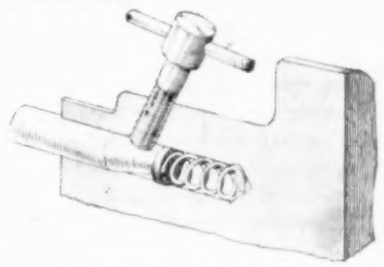


DRAWING ROOM TEMPLETS

A Simple Spring Pin

By Ira Hill

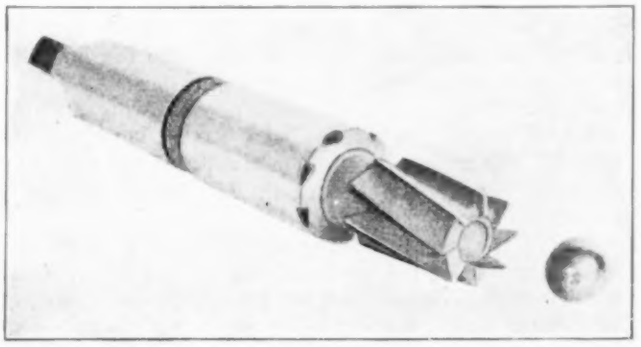
The accompanying sketch shows a spring pin arrangement which I have found works very well and is more easily made than the ordinary design. The spring pin is turned taper, as shown, and the binding-screw hole is tapped perpendicularly to the tapered side of the pin.



A SIMPLE SPRING PIN

Grinding an End Mill with Only One Center Hole

Grits and Grinds shows an interesting kink for holding work on centers for grinding. In grinding an end mill like that shown in the illustration, the common practice is to put one end on the center and use a steadyrest in the middle. If the mill has an opening in the end, like the one illustrated, it can be held rigidly between centers by placing a steel ball between this opening and a female center.



THE END MILL AND THE BALL TO FIT THE FEMALE CENTER

IN THIS ISSUE

"SELLING Machinery in Europe Since the Armistice" is the rather unusual article that opens this issue. It was written by Oliver Field Allen, formerly Major, 24th Engineers, who was on the ground for some time after the armistice was signed and was in a position to get at facts first hand. He has drawn conclusions as to why American manufacturers have not been able to dispose of more machinery in Europe, dealing with the subject from a point of view which takes in sales and advertising methods chiefly, and does not include treatment of the effect of existing rates of exchange. It will be remembered that there was great confidence among American manufacturers as to the possibilities of large sales to the countries which had been devastated and would therefore be compelled to reconstruct to an appreciable extent. Such hopes were founded on logical thought and it is probable that we should have had much more business than we have enjoyed had the countries referred to been possessed of more money, or what would have amounted to the same thing, long-term credit. Mr. Allen's article, therefore, is timely in that it gives some very good information as to necessary methods to be followed in selling machinery once the ability to pay for it is established, because at this time indications are that the Foreign Trade Finance Corporation is started on the way toward solving some of the financial difficulties of our European buyers.

Basset, in his modern production methods article, page 398, takes up the subject of accounting for supplies. He explains how the cost of non-productive materials gets into the final cost of the product and tells of correct and incorrect pricing methods. The sample cards, expense forms and distribution forms included strike us as very valuable indeed. The article as a whole maintains the very high standard set by Mr. Basset in his earlier articles of the series.

Where the nature of the work makes a large shop necessary one of the main factors in cost is inter-shop transportation. When such work consists almost entirely of repairs, and especially when the units are large, the system of conveying every piece on which machine work must be done to the machine proves costly indeed. Traveling cranes have so facilitated the handling of heavy pieces that they may be said to have solved the difficulty for the average production shop. Not so with shops devoted to large repair work, however, more especially those making locomotive repairs. Moving the machine to the work has become an accepted part of the systems of many such shops. In large measure the machines so moved are standard machine tools mounted on wheels. On page 403 Hunter tells of the portable equipment of the Chicago & Alton shops at Bloomington, Ill.

Trade teaching has settled down upon us to stay. Nobody disputes the truth of such a statement. Almost every shop of any size possesses a training department of some kind and many of the smaller shops are finding it profitable to give their newcomers systematic instruction. Where are all the teachers of these many schools coming from? We suppose that the majority of them have just grown. From Ohio, which gave us our President and the World's Champions, has come a contribution on training trade teachers. It tells of the Toledo system, now in its second year. Page 405.

Fred Colvin continues on inspection of automobile parts. His articles this week, page 407, tell of the importance to quality of inspection methods and details some of the methods of inspection in use on Essex and Studebaker pistons and connecting rods.

We must confess to a whole lot of admiration for Sheldon's article on the father of the magnetic chuck. We have read "The Romance of Steel" and "The Romance of the Reaper" and we believe that we have now read the romance of the magnetic chuck, or that at any rate we shall have done so after we have finished the entire series. There are two particularly good features about this week's story—the story itself and the way it is told. Page 412.

Last week you read the first part of the fifth of the DeLeeuw articles on metal cutting tools. You will remember that we said that these articles are better as they go deeper into their subject. You will find that the continuation of part V, page 418, lives up to our advance notices.

Shop Equipment News begins on page 428.

Coming Features

The second of Erwin H. Schell's management articles is scheduled for the issue of March 17. It tells of such things as the distinction between management and capital, the duties of management, the tools of leadership and the value of consistency in discipline.

Stanley will tell of the application to the railroad shop of a very useful machine, the draw-cut shaper.

Hunter has gone into the details of crankshaft turning practice in an article that will appear next week.

Oliver Field Allen's article on selling machinery in Europe since the armistice will be concluded.

Colvin will continue with his articles on the foreman and his job, a series that is proving very popular.

The sixth of DeLeeuw's series on metal cutting tools will be started. It continues the subjects of boring and boring tools.

EDITORIALS

A Rift in the Clouds

PRESIDENT WILSON'S signing of the Winslow partial payment bill making available some $340,000,000 for the railroads shows promise of producing a bright spot in the general gloom which yields so slowly to treatment. Not only will it relieve the strain on the railroads to a certain extent, but it will also provide some business for the machine tool and supply people.

The amount of new business will undoubtedly be much smaller than either the railroad purchasing agents or the manufacturers of tools and supplies would like to have it, but it will be one more item among several that will improve the general situation.

The most serious problem facing the railroads, and the government organizations regulating them, is the so-called "liquidation of labor." When railroad wage rates have been equitably adjusted there should be a pronounced change for the better in railroad equipment and in railroad shops but the process of adjustment is sure to be slow. Consequently this measure affording temporary relief is more welcome than it otherwise would be in a generation that thinks in billions rather than in millions.

Real Patent Progress

THOSE interested in the welfare of our patent system—and who is not so interested—may congratulate themselves that the conferees of the Senate and the House of Representatives have agreed upon the higher salary scale for the staff of the Patent Office. There seems to be no doubt that this legislation will be enacted within the next few weeks and thus provide more adequately than ever before for the technical staff of this institution.

With such a staff as we can now look forward to, we may well anticipate, not only increased facilities in securing a good patent, but increased protection against patents which never should have been granted. This condition existed because the examiners were both under-paid and over-worked and could not give that consideration to the affairs of their office which they knew, as well as others knew, should be given.

Making Business Heard

THE Chamber of Commerce of the United States is taking a distinct step forward in organizing a Department of Resolutions and Referenda. The new department should prove very effective in making the wishes of American business heard before legislative committees and through various public agencies.

The resolutions that have been passed as the result of referendum votes by the members of the National Chamber have proved valuable as indications of the sentiment of American business. Many of these resolutions unfortunately have not carried the weight they were entitled to because of the lack of a suitable organization to insure their proper presentation. As it is a matter of several months to take such a referendum vote in a body as large as the Chamber of Commerce of the United States, the result obtained is anything but a snap judgment and is worth careful consideration, whether its subject be labor, transportation, banking, exports or one of many others of importance.

In the keen economic struggle ahead of us, those in authority will do well to pay careful heed to the composite opinion of the American business man. The business man in his turn will do well to take full advantage of the opportunities offered by the Chamber through its Resolutions Department.

Federated American Engineering Societies Favors Local Section Principle

IT IS encouraging to note that at a recent meeting of the executive council of the Federated American Engineering Societies the sentiment strongly favored the formation of local sections. The local section idea has been well tested by the American Society of Mechanical Engineers and has been very successful.

With the much larger local membership which the Federated Societies will possess, their program of mutual and community service should be easy to carry out. The members of the local section will be residents of the community and directly affected by any improvements their efforts as members of the Federation are successful in accomplishing. Consequently, their interest is likely to be energetic enough to be productive of results that will benefit us all.

Records of the Air Mail Service

AIRPLANE accidents are always given wide publicity, but little attention is paid to the remarkable service records of the veteran planes of the Air Mail Service until they come to grief. Their reputations, like those of many men, are destroyed by one slip after long periods of faithful and honorable service.

A statement recently issued by the Post Office Department tells of the achievements of a few of the older planes. Of the first eight purchased for carrying mail, seven are still in commission. One of them has been in the air for 207 hours, another for 141. As these planes are nearly three years old, their total flying time is nothing remarkable unless we take into account the fact that when they were built airplane mail carrying was an untried venture and they were consequently largely experimental.

Two of the much-criticized DeHaviland planes have records of more than 38,000 miles at an average speed of over ninety miles an hour. Total figures are even more impressive. Up to the end of 1920, Air Mail planes were in the air 18,800 hours and covered 1,572,500 miles, carrying more than 49,000,000 letters. The cost of repair parts and labor was at the rate of 30.5 cents per mile flown.

In the face of such records doesn't it seem a very short-sighted policy to hamper the development of the Air Mail Service in any manner?

SHOP EQUIPMENT NEWS

SHOP EQUIPMENT • NEWS •
A weekly review of modern designs and equipment

Descriptions of shop equipment in this section constitute editorial service for which there is no charge. To be eligible for presentation, the article must not have been on the market more than six months and must not have been advertised in this or any previous issue. Owing to the news character of these descriptions it will be impossible to submit them to the manufacturer for approval.

• CONDENSED • CLIPPING INDEX
A continuous record of modern designs and equipment

Lumsden No. 86 Oscillating Surface-Grinding Machine

Alfred Herbert, Ltd., Coventry, England, and 54 Dey St., New York, N. Y., as sole distributor for the Lumsden line of machine-tools, is placing on the market the

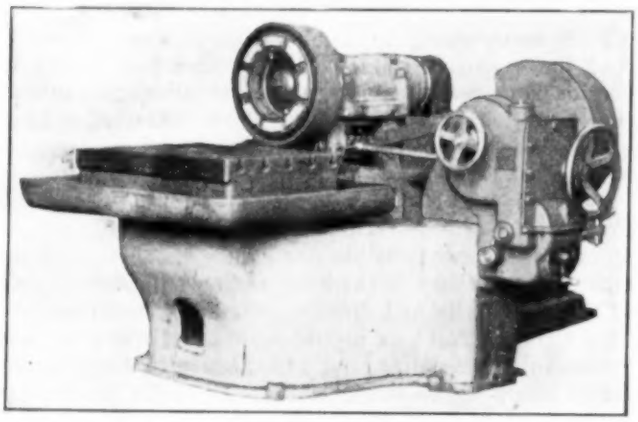


FIG. 1. LUMSDEN NO. 86 OSCILLATING SURFACE-GRINDING MACHINE

Specifications: Capacity, largest surface ground, 24 x 10 in. Face to be ground must be at least 4 in. above surface of table. Working surface of table, 36 x 25½ in. Grinding wheel: diameter, 16 in.; number of segments, 8. Wheel motion: Maximum stroke, 24 in.; hand feed, 3 in.; oscillations per minute, 10.8, 21.6 and 43.2. Wheel-spindle speed, 1,088 r.p.m. Speed of driving pulleys, 775 r.p.m. Width of driving belt, 6 in. Horsepower required, 20. Floor space, 9 ft. 6 in. x 6 ft. 9 in. Approximate net weight, 8,100 lb.

oscillating surface-grinding machine shown in Fig. 1. The machine is known as the No. 86 and is said to be especially adapted to locomotive, shipbuilding and general engineering shops, where products such as steel railway buffers, axle boxes and covers, and similar parts having plane surfaces require grinding. It is stated that the output is rapid, surfaces up to 24 x 10 in. being handled.

The machine is built on the same principle as the Lumsden oscillating tool-grinding machine, the grinding-wheel head being mounted on a substantial swinging arm whose base consists of two trunnions, which are supported by broad bearings on a shallow box-section bed. The arm is free to oscillate about the center of these bearings, the movement being obtained by means of a connecting rod operated by a crank on a three-speed gear box fixed to the bed of the machine. The construction can be seen in Fig. 2. By adjusting the throw of the crank, the stroke of the oscillating arm on the path of the grinding wheel center can be varied from zero to a maximum of 24 in.

The grinding-wheel head consists of a 16-in. segmental cupped wheel, having eight segments and mounted on a ball-bearing spindle carried in a ram, which has an adjustment parallel with the axis of the spindle. This adjustment, which is for feeding the wheel to the work, is controlled by a handwheel on the gear box and can be operated when the arm is in motion. The wheel segments are 6 in. long and can be used down to a length of 2 in., or even 1½ in., if care be taken in chucking them.

The spindle drive is by belt from a self-contained countershaft, situated on the center of oscillation of the swinging arm and supported both by ball bearings in the trunions and also by a bearing on the bed. Facing the grinding-wheel head is a T-slotted work table surrounded by a cast-iron trough. An ample supply of water can be provided by a pump driven from the countershaft. The machine is self-contained.

There are three speeds of oscillation of the wheel, suitable for different lengths of wheel stroke, 43 strokes per minute being used for strokes up to approximately 8 in. long, 21½ for strokes from 8 to 16 in., and 10 for strokes from 16 to 24 in. in length. With regard to production, it is stated that on a steel railway buffer ⅛ in. has been ground from a plane surface 13 x 9 in. in 2 minutes; that on steel axle boxes and covers 11 x 9 in. in size a rim ¾ in. wide has been ground in 1½ min-

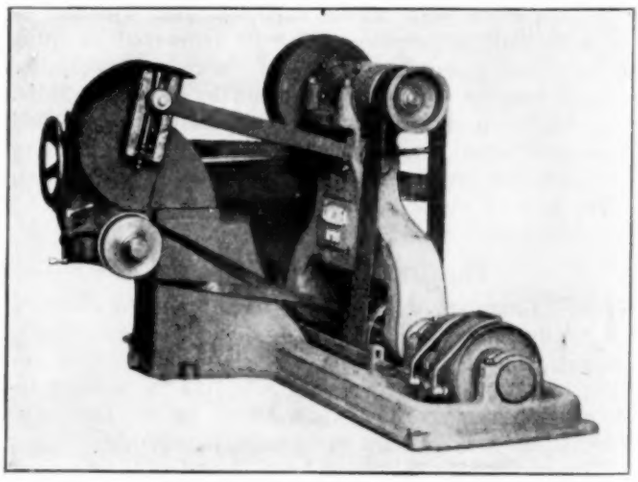
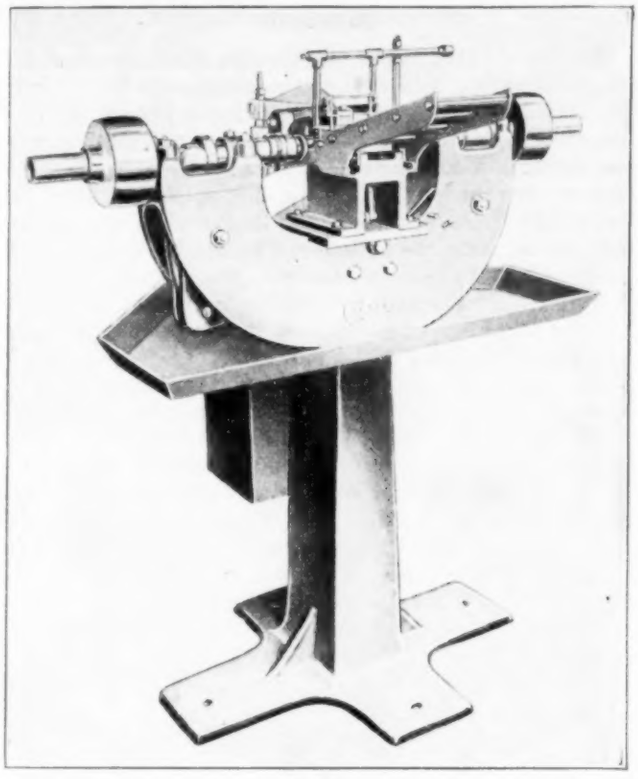


FIG. 2. REAR OF LUMSDEN SURFACE-GRINDING MACHINE

utes, ⅛ in. of stock being removed; and that ⅛ in. has been removed in 1½ min. from the 1½-in. rims of 12 x 12 in. cast-iron boxes.

Grant Opposed-Spindle Automatic Chamfering and Threading Machine No. 183

The Grant Manufacturing and Machine Co., Bridgeport, Conn., has recently added to its line of double-spindle automatic chamfering and threading machines



GRANT OPPOSED-SPINDLE AUTOMATIC CHAMFERING AND THREADING MACHINE NO. 183

Specifications: Height from floor to center of spindles, 44 in. Maximum capacity between spindles, 12 in. Diameter of spindles, 1¼ in. Height of spindles above table, 6 in. Size of table, 9 x9 in. Diameter spindle pulleys, 6 in. Driving belt width, 2½ in. Height over all, 48 in. Floor space, 68 x 30 in.

the No. 183 machine shown in the illustration. The principal parts of the machine are two cutter spindles, the magazine, and the work-holding and feeding table. The spindle bushings have a lateral adjustment of approximately 2 in. by means of hardened collars, and are fed to the work by levers situated below them and operated by face cams within the body of the machine.

The automatic movements are controlled by a small hand lever at the front of the machine. The operating mechanism is located at the rear of the machine, the driving pulley being provided with a roller friction clutch. The shaft bearing this pulley passes through to the front of the machine, and is provided with a worm-and-gear drive for the camshaft which operates the levers feeding the spindles. Another worm and gear operates the clamping device through cams mounted on a short shaft.

Ordinarily, the work is placed in the inclined hopper or magazine, from which it is fed by a slide mechanism to the proper machining position, where it is clamped and rigidly held by the clamps at the top and center of the machine while the work is being done. The finished pieces are then automatically ejected. The hopper or magazine and the feeding mechanism may be modified to suit various kinds of work, such as square, hexagon or other irregular shapes, where an operation is to be done on both ends of the piece of work.

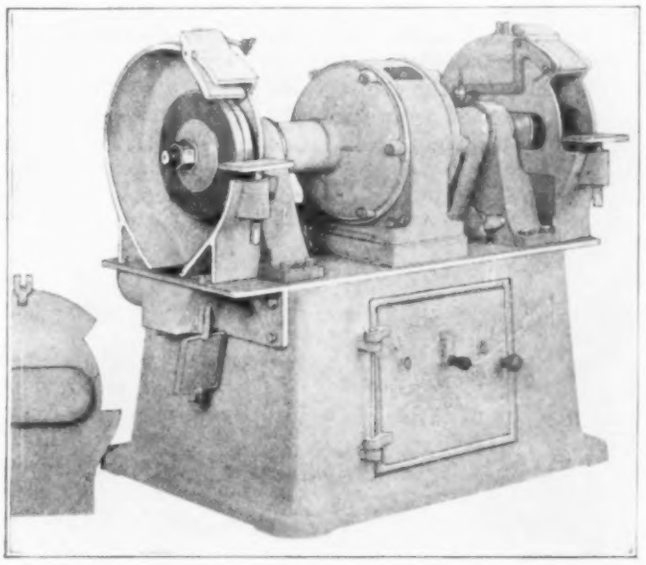
With slight modification the machine, which is shown equipped for double-end chamfering, can be readily adapted for threading both ends of small rods automatically. It can also be equipped with tools to drill and counterbore, or countersink, both ends at one time. An oil tank and gear-driven pump are provided, the cutting lubricant being fed to the tools through pipes. A countershaft is provided.

Marschke No. 18 Floor Grinding Machine

The Marschke Manufacturing Co., Indianapolis, Ind., has added to its line the No. 18 floor-type, motor-driven, dry grinding machine shown in the illustration. This machine will carry 18 x 3-in. grinding wheels on both ends. It is designed for heavy duty and the arbor is mounted on four Hess-Bright ball bearings. The motor starting mechanism is placed in the pedestal, and is controlled by the lever extending through the door at the front.

The wheel hoods are adjustable and can be set so that the wheel is always at the front of the hood. One side cover is removed in the illustration. The spark plate adjusts itself to the wheel as the steadyrest is adjusted. This is done by moving the hood by means of a single handwheel on the side toward the motor. The machine can be furnished with or without an exhaust fan, the illustration showing it equipped with the fan, which is mounted inside the pedestal and is driven by a chain. This drive is enclosed in a housing to keep it free from dust.

The motor starter is mounted on the back of the door of the pedestal and moves with the door, permitting access to the exhaust blower. The hood support acts as a part of the piping for the exhaust. It has an opening directly under the hood to serve as a clean-out. When



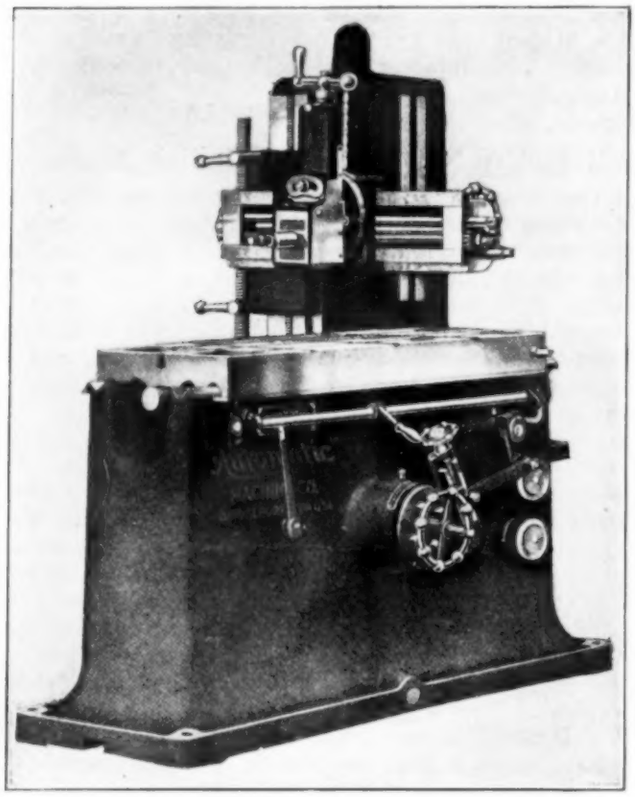
MARSCHKE NO. 18 FLOOR-TYPE DRY GRINDING MACHINE

Specifications: Motor: a.c., 2 or 3 phase, 60 cycle, 220 or 440 volt; d.c., 110 or 220 volt; size, continuous service, 5 hp., intermittent, 7½ hp. Speed: no load, 1,200 r.p.m.; full load, 1,160 r.p.m. Carries two wheels, 18 x 3 in. Arbor: length, 54 in.; diameter in wheel, 1¾ in.; diameter in armature core, 2⅞ in. Floor to center of arbor, 34 in. Floor space, 32 x 64 in. Weight: with a.c. motor, 2,200 lb.; with d.c. motor, 2,300 lb.

grinding brass, a container can be placed beneath this opening to catch the particles of metal and thus permit only the dust to pass through the blower.

Coulter Open-Side Crank Planer

The latest type of Coulter open-side planer, having a crank drive to the work table and built by the Automatic Machine Co., Bridgeport, Conn., is shown in the



COULTER OPEN-SIDE CRANK PLANER

illustration. The machine is similar to that described on page 819, Vol. 50, of the *American Machinist*, being particularly adapted to toolroom work.

A feature is the combination clutch and brake mechanism, operated from the front of the machine, and by means of which the table can be stopped and started instantly without change of the motion of the motor or countershaft. No countershaft is necessary on the belt-driven model, as it can be belted directly to the main line shaft. An indicator shows the length of stroke, and clamps are provided for locking the down feed while the crossfeed is working, or vice-versa.

The clutch-brake mechanism consists of a raybestos-lined brake and the main driving pulley, made up of two concentric wheels, the inside rim of one and the outside rim of the other being beveled to form a conical clutch. When by movement of the operating handle the clutch is thrown out, the brake is simultaneously applied, but released again when the clutch is thrown in. There is a split nut on the driving shaft, so that the amount of friction in the clutch can be adjusted. From the friction pulley, the power is transmitted through sliding gears of large diameter to a bull wheel and crank which drive the table, similar to the mechanism driving a shaper ram. The transmission shafts of the driving mechanism run on ball bearings. The mechanism is said to be both simple and substantial.

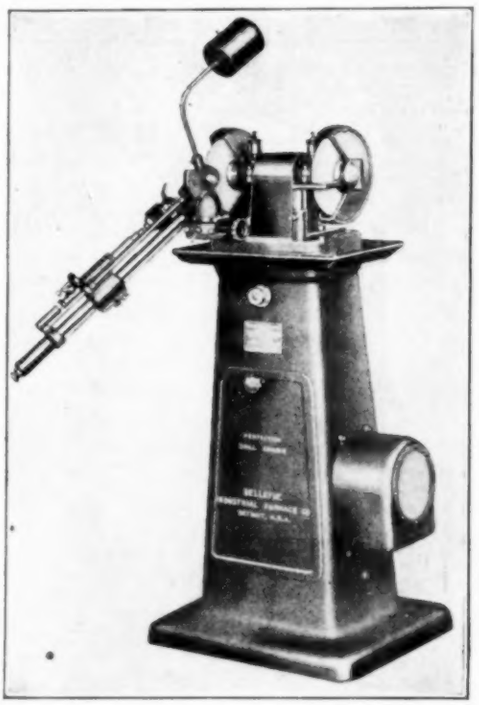
It is stated that the machine contains the advantages found in a shaper, such as the quick return stroke, variable speeds, and the ability to cut to a shoulder, with the accuracy and table capacity of a planer. The maximum stroke can be taken anywhere on the table by merely positioning the table under the tool without disturbing the work, and the maximum stroke can be taken with the same degree of accuracy as a shorter one.

Bellevue Semi-Automatic Drill-Grinding Machine

The semi-automatic drill-grinding machine shown in the illustration and designated as No. 20-B has been placed on the market by the Bellevue Industrial Furnace Co., Detroit, Mich. It is a self-contained unit with its driving motor located in its pedestal and partly inclosed by the projecting housing on the right of the pedestal. It is equipped with a two-step cone pulley for the drive to the spindle. The machine can also be arranged so that it can be driven from a line shaft.

The machine grinds on the periphery of the wheel instead of on the side. It can be equipped with a carriage for grinding left-hand drills, as well as right. Drills with two, three and four or more lips can also be ground. An index is provided for use in setting the drill, for grinding each lip; and a gage for setting the drill in the carriage insures that no more stock is taken from the drill than is necessary. The grinding wheel can be trued by a diamond or other truing device that can be placed in the chuck, which is brought forward against the gage, as when grinding a drill. The carriage is then moved across the face of the wheel by a crossfeed, so that the wheel is dressed by the truing tool.

The machine is made in two sizes. The smaller size



BELLEVUE NO. 20-B SEMI-AUTOMATIC DRILL-GRINDING MACHINE

handles drills from $\frac{1}{8}$ to $1\frac{1}{2}$ in. in diameter, the smaller sizes of drills being held in any standard form of chuck. The larger machine grinds drills from $\frac{3}{4}$ to 3 in. in diameter.

Glow Electric Bench and Floor Grinders

The Glow Electric Co., 219 Walnut St., Cincinnati, Ohio, has added to its products a line of totally inclosed electric grinders and polishing stands. The bench grinder, shown in half-section in Fig. 1, is intended to be used in assembly rooms and where space is limited. It is portable, readily installed and when desirable can be re-located in a short time in proximity to the work to be performed.

The grinder mounted on a pedestal, as shown in Fig. 2, is intended for general shop and toolroom use and a water pocket can be built in the pedestal. The polishing stand is intended to be used on general polishing work. It has comparatively short spindles and large clearances for the work. Due to the contour of the enclosing shell, it can easily be kept clean. The device equipped with scratch brushes, is adapted for brushing and scouring small articles, such as plating ware and musical instruments, being especially intended for the use of manufacturing jewelers.

The machine is built in capacities of ¾, 1, 3, and 5 hp., for either direct or alternating current, and either with or without pedestals. The head is totally

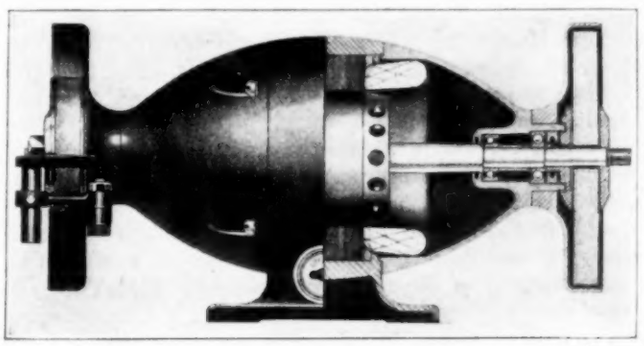


FIG. 1. GLOW ELECTRIC BENCH GRINDER

Specifications: For scratch-brush use, furnished in two sizes, Type BL 8 and BL 10. Hp., ¾ and 1, respectively. Maximum diameter of brush, 6 and 8 in. Weight, 65 and 140 lb. Speed, 3,600 and 1,800 r.p.m. Length of spindle extensions, 4 to 8 in.

Grinders furnished in four types; BG 8, BG 10, BG 14-3 and BG 14-5. Hp., ¾, 1, 3 and 5, respectively. Speed, 3,600, 1,800, 1,200 and 1,800 r.p.m. Wheel size, 8 x ¾, 10 x 1, 14 x 2 and 14 x 2 in. Overall dimensions, 8½ x 18, 11½ x 23, 16½ x 35 and 16½ x 35 in. Weight with pedestal, 170, 290, 560 and 560 lb. Weight without pedestal, 75, 155, 360 and 360 lb.

Polishing stands furnished in four types; PL 8, PL 10, PL 14-3 and PL 14-5. Horsepower, speed and wheel diameter, same as for Type BG. Overall dimensions, 8½ x 23, 11½ x 30, 16½ x 45 and 16½ x 45 in. Spindle extension at each end, 4, 5½, 8½ and 8½ in. Weight: with pedestal, 155, 265, 530 and 530 lb.; without pedestal, 65, 140, 330 and 330 lb.

Grinders and polishing stands furnished standard for 115, 230 and 550 volt d.c., and for 110, 220, 440 and 550 volt, 2 or 3 phase, a.c. Types 14-3 and 14-5 for floor mounting furnished with push-button control.

enclosed and is dustproof. It is said that the oil wells of the machine are filled with a special oil before leaving the factory, so that no further lubrication for a period of at least one year is required.

The motors are of normal rated capacities, and will take care of overload with only a small temperature rise. Two annular ball bearings having a spacing sleeve between them are used on each side. They are said to be of such size as to withstand 100 per cent more load than the capacity of the wheel. The inside flange is keyed to the shaft and has but small clearance, to prevent dust from getting into the bearings or oil from getting out. There is a dust collar between the inside flange and the outer ball bearing.

The grinders are equipped with heavy cast-iron guards and adjustable work rests. The 3- and 5-hp. machines are furnished with push-button controllers that are mounted inside of the pedestal as standard equipment. The bench machine in the smaller sizes is

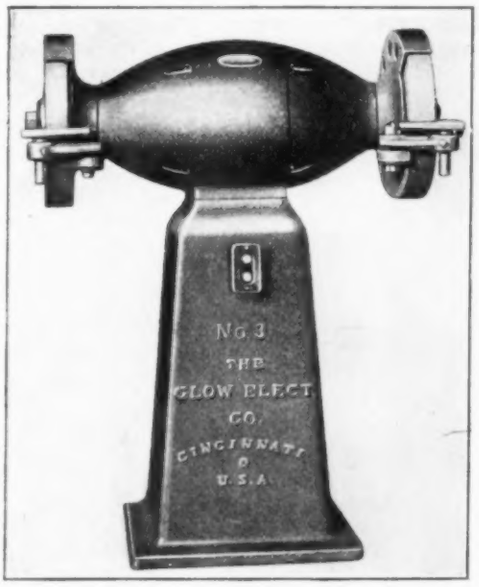


FIG. 2. GLOW ELECTRIC FLOOR GRINDER

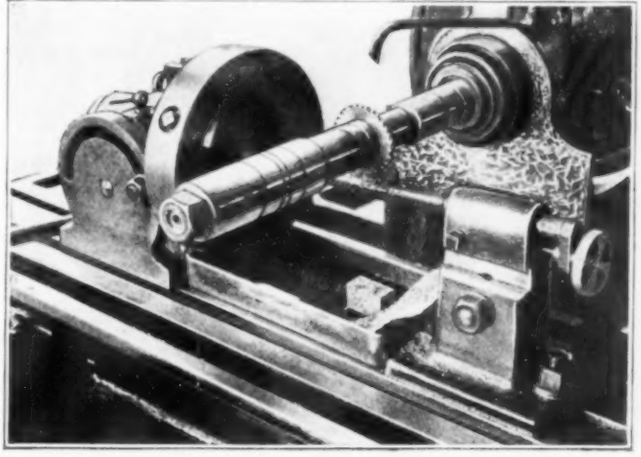
equipped with a snap switch, mounted in the frame of the motor, so as to make the switch convenient for use and to protect it.

The specifications given under Fig. 1 show the different styles in which the machines are made, essentially the same mechanisms being adapted to the different classes of work.

New Britain Adjustable Tail Center

The New Britain Tool & Manufacturing Co., Harvard St., New Britain, Conn., is making an adjustable tail center as a complement to the indexing head made by the same concern and described and illustrated on page 143, Vol. 51, of the *American Machinist*.

The height of the center can be adjusted within rea-

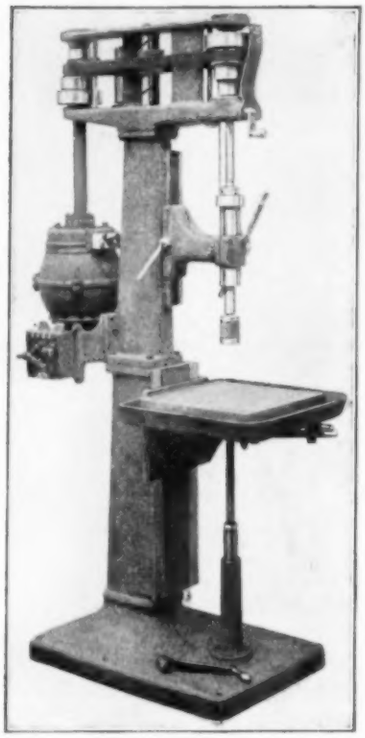


NEW BRITAIN ADJUSTABLE TAIL CENTER

sonable limits, to furnish an outboard support when fluting taper reamers or similar work. The bracket holding the center is secured in place on the base by only one bolt, so that the center can be swivelled to the desired angle and clamped. The device is here shown in position on the table of a milling machine.

"Pecorp" Floor-Type Sensitive Drilling Machine

The illustration shows the Model H floor-type sensitive drilling machine recently placed on the market by the Providence Engineering Corporation, office at 5 Nassau St., New York, N. Y., and plant at Providence, R. I. The machine was formerly known as the Mason-Widmer drilling machine, and is built in two styles, the Model K having a larger table than the Model H. The machine is fully equipped with ball bearings. The spindle is provided with a device for retaining the lubricating oil, a reservoir in the sleeve holding enough oil to lubricate the bearings for a week, it is stated. Because of the fact that the non-rotating sleeve extends below the bearings, oil which has passed through the bearings is thrown against the inside of the sleeve by the spindle and then drops straight downward from the bottom of the sleeve, instead of being thrown outward and upon the operator.



"PECORP" MODEL H FLOOR TYPE SENSITIVE DRILLING MACHINE

The feed handle can be fixed in any position, so as to make it convenient to the operator. The head contains the speed-change and cone pulleys. The belt can be shifted by means of a crank on the front of the head, one complete turn of the crank shifting the belt one step, the shifters then being automatically locked in place. The cone pulleys can be removed without taking out the vertical shaft, through which the head is driven. Two idlers tighten the belt, which is under tension only when the load is applied, thus saving wear on the belt.

The table can be moved by means of a telescopic screw geared to a shaft operated by a removable crank. It has a channel around the edge and is provided with a device for clamping it to the dove-tailed ways on the column. The machine can be driven by means of a belt, the drive shaft being placed horizontally, or by means of either horizontal or vertical motors, the illustration showing the latter type. The machine can be made with any number of spindles up to eight, and a pump and piping can be furnished to handle cutting lubricant. Automatic power feed and tapping attachments can be provided.

Specifications: Maximum distance, table to spindle, 32½ in. Spindle: diameter, 1 in.; traverse, 14 in.; taper hole, No. 2 Morse. Traverse of feed rack, 6 in. Speed of driving pulley: carbon drills, 380 r.p.m.; high-speed drills, 525 r.p.m. Spindle speeds: number 4: 400, 800, 1,200, 1,600, for carbon-steel drills; 550, 1,100, 1,650, 2,200, for high-speed drills. Height, 79 in. Net weight with single spindle, 925 lb. Table, for single-spindle machines: Model H, 16 x 16 in.; Model K, 20 x 24 in. Floor space, 22 x 42 in.; and 26 x 46 in., respectively. Multiple-head machines: distance between spindles, 9 in. for Model H, 18 in. for Model K; table size and weight increase correspondingly for machines having any number of spindles up to 8.

Rotary Table for Cleveland Milling Machine

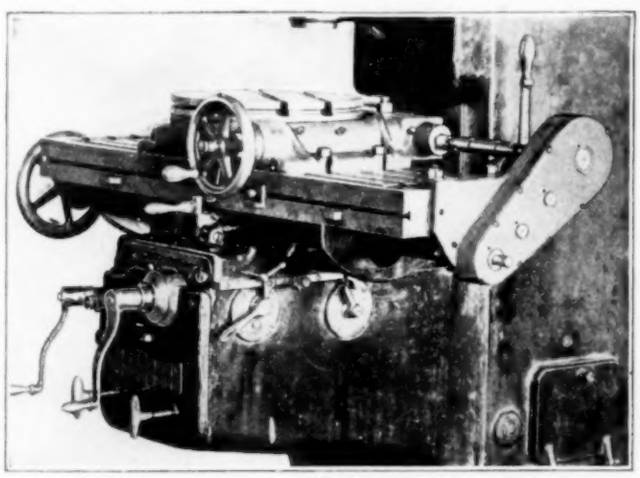
The rotary table shown in the illustration is built by the Clark-Mesker Co., 18511 Euclid Ave., Cleveland, Ohio, for its line of Cleveland milling machines. There are two sizes of the table, which are designated as Nos. 1 and 2, for the corresponding sizes of milling machines. The rotary table can be operated either by hand or by power feed. There are 16 changes of power feed, controlled from the front of the knee by the same mechanism that controls the feed changes for the sliding table. The direction of rotation may also be reversed by the feed-reverse lever, to be seen on the front of the knee.

A set of telescopic sleeves connects the feed drive gear for the milling machine table with the gear case on the end of the table. From this gear case, a shaft provided with two universal joints transmits the feed motion through a pair of bevel gears to the worm drive within the body of the rotary table. Hand feed is obtained by means of the handwheel placed at the front of the table.

The table driving worm is made with coarse pitch and runs in oil. Its end thrust in each direction is taken care of by ball thrust bearings, and means are provided for taking up the wear. The wormwheel is of large diameter, to enable heavy cuts to be taken near the circumference of the table without undue strain on the bearings and teeth of the worm.

The table rests in a taper bearing, which is said to be but little affected by wear. Its surface is slotted, with T-slots of the same size as those in the milling machine table. The table has an automatic trip for releasing the power feed at any desired point. The circumference of the table is graduated in degrees. A taper hole is provided in the center for accommodating a short taper arbor, for use when centering gears and similar work.

The rotating table is surrounded by a coolant-collecting trough that is formed by a rib cast on the base.



ROTARY TABLE APPLIED TO CLEVELAND MILLING MACHINE

Specifications: Made in two sizes for No. 1 and No. 2 milling machines. Respective details: Diameter of table, 14 and 16 in. Diameter over oil pan, 16½ and 18½ in. Height, 5¼ in. and 5¼ in. Size of taper hole in center of table, No. 11 B. & S. Weight: net, 315 and 375 lb.; shipping, 365 and 435 lb.

A crank and index plate can be furnished for this attachment, and it can then be used in a manner similar to ordinary dividing centers. When so equipped, it can be used for such work as cutting large gears.

Hill Test Indicator

The illustration shows a test indicator made by M. B. Hill, 10 Eden St., Worcester, Mass. The rectangular shank is carbonized and hardened, and is split so that the tool may be held in the toolpost of a lathe and clamped against turning by the toolpost screw. The stock can be turned easily within the shank, so as to bring the graduated scale into any position convenient for reading. The little bellcrank lever is also adjustable as to position, or may be removed and the implement presented to the work at a right angle. The surface-gage standard is not a part of the tool, but is shown to demonstrate one manner of holding.

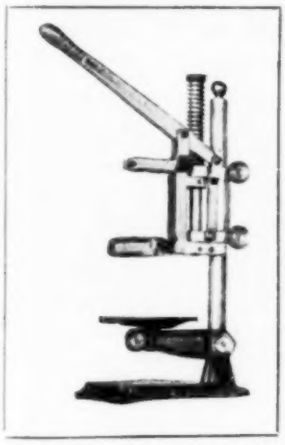
HILL TEST INDICATOR

The bell crank is held in position by a spring clamp, and may be put on and taken off without the aid of tools of any kind. Its use allows the indicator to be presented to the work from different angles. Each graduation on the scale represents a motion of 0.001 in. of the sensitive point.

Arnold Lever-Feed Bench Stand

The Arnold Electric Tool Co., 114 Liberty St., New York, N. Y., has added to its line a lever-feed bench stand, shown in the illustration. It is intended to be used in connection with the company's portable drills and by its use a portable drill can be converted into a lever-feed bench drill.

The column of the stand is made of cold-rolled steel, the base and table of cast iron, and the frame and handle of malleable iron. A coil spring prevents the lever from dropping when the drill is not in contact with the work, or after the point of the drill has cut through. The head holding the drill can be shifted on the column, being clamped by means of thumbscrews. The drill is held in place by means of two straps, it being necessary to remove the handle from the drill before placing it in the frame.



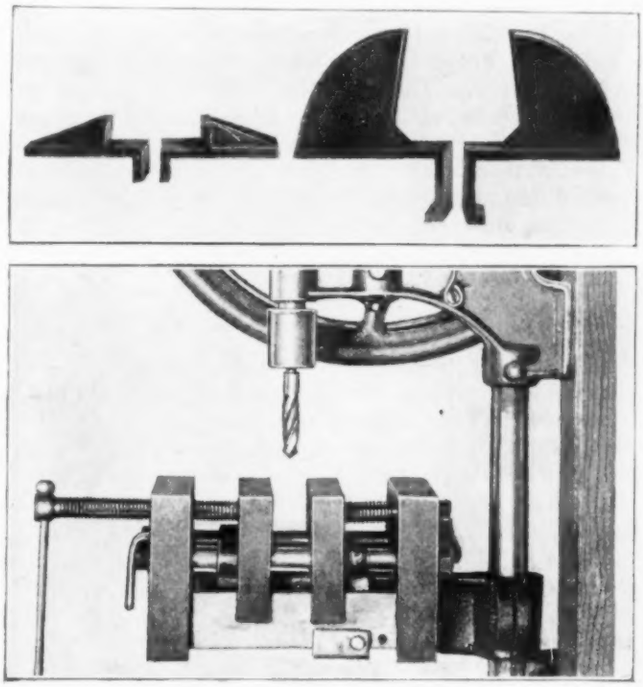
ARNOLD LEVER-FEED BENCH STAND

The table is 6½ in. in diameter, and can be pivoted in the table arm, which swings on the column. The distance from the center of the table to the column is 4⅝ in. The stand is furnished for two types of drills; one for the Type B ⅝-in. drill weighing 40 lb., and the other for the Type C ½-in. drill weighing 55 lb. It is 23 in. high and has a feed travel of 2½ in.

Joyce Drilling Machine Vise

The Joyce Drill Vise Co., P. O. Box 704, Amarillo, Texas, has recently placed on the market a drilling machine vise. The vise is made in two sizes, opening 5½ in. and 11 in., respectively. Both jaws of the vise are movable, which permits different sizes of work to be held without changing the position of the vise on the drilling machine. The rear jaw is moved by means of a thumbscrew. The front jaw is moved and the work is clamped by the screw which is actuated by the vise handle. The jaws are held in alignment by and slid upon two rods. By operating two small cam levers, one at each end of the vise, the half-nuts engaged in their respective screws, are released and the jaws may be pushed by hand to the work, then re-engaged into the screws and tightened.

False jaws, shown at the top of the illustration, are furnished with the 11-in. vise. The false jaws are not fastened to the vise jaws and may be easily lifted off and laid aside when not in use. The set shown at the left has a capacity up to 7 in. in width. The set at the right may be used for holding pipe, pulleys or round articles up to 9 in. in diameter.



JOYCE DRILLING MACHINE VISE

It is stated that the vise saves time, drills and labor, and that it is substantially and durably made. It can be attached to any make of drilling machine. The illustration shows one method of attaching the vise. For fastening it on the table of a drilling machine a set of special clamps is furnished.

Houston, Stanwood & Gamble Plate-Bending Press

The Houston, Stanwood & Gamble Co., Cincinnati, Ohio, has recently placed on the market a plate-bending press, shown in the illustration. It is especially intended for use in boiler or tank shops, or in any plant doing plate or structural-steel work.

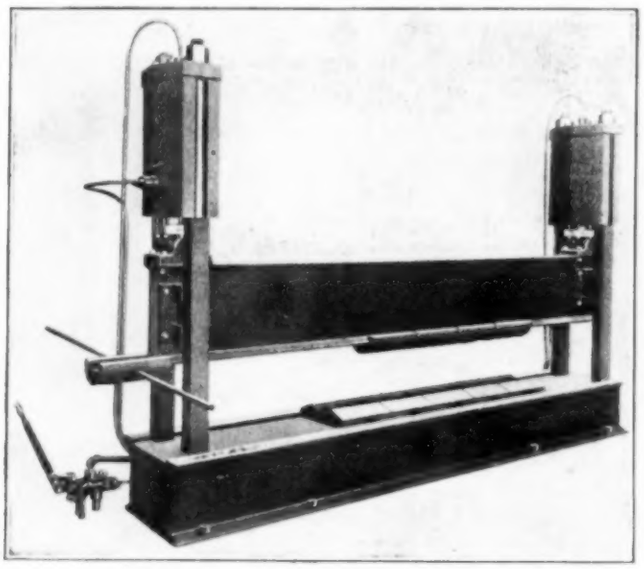
The machine consists of a simple arrangement of a crossbeam, connected to vertical rams at each end by

means of hinged bearings, which give flexibility and allow the beam to adjust itself to any unevenness of the work. The frame consists of four uprights holding large bolts, which pass through the cylinders at the top, and through the heavy reinforced base casting at the bottom. The upper sectional dies are placed on the beam of the machine from the end, as shown at the left, being lifted by means of a bar and then slid into position. The lower sectional dies are placed on the bed of the machine, and aligned with the upper dies by means of the side strips which extend above the base casting for that purpose, and which reinforce the bed.

Either short, long, or sectional dies can be used, flat dies being provided for straightening plates and curved ones for such work as bending boiler plate. It is stated that most bending work can be handled much more quickly than by means of a bending roll, and that a number of plates can be bent to duplicate a particular shape. Angle iron, too, can be bent by means of suitable dies.

The operating lever for controlling both the working and the return strokes is conveniently located at one end of the machine. The entire upper part of the machine is flexible to a necessary degree which takes care of any unequal strains and stresses during the working stroke. The machine does not require an auxiliary ram for returning the crossbeam to its upper position, so as to receive the work.

The machine is built in various sizes and capacities to suit different classes of work, and it can be furnished to operate either on compressed air or on hydraulic

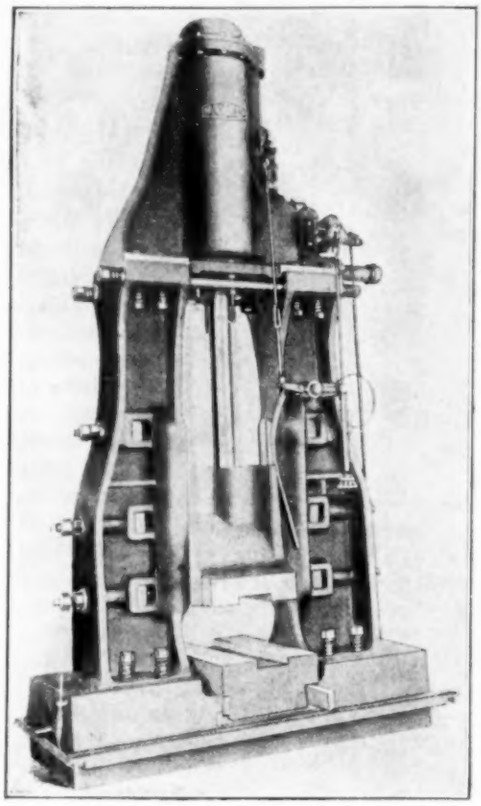


HOUSTON, STANWOOD & GAMBLE PLATE-BENDING PRESS

pressure obtained from city mains or provided by means of a pump, one of which types of pressure is usually available in plants doing work on large plates.

Massillon Steam Drop-Hammer

The Massillon Foundry and Machine Co., Massillon, Ohio, has lately redesigned its line of steam drop-hammers, the recent model being illustrated. The housings are annealed steel castings of I section, machined to fit in deep pockets in the hammer base, which is likewise a steel casting. The cylinder is a semi-steel casting that has been reinforced over the valve. It interlocks in the tops of the housings, so that no tie-plate is required. A safety cylinder is provided to protect the hammer in case the piston rod breaks, it being so made



MASSILLON STEAM DROP-HAMMER

that the piston ascends against a cushion of live steam. Any standard type of valve can be furnished. The valve bracket and the steam-inlet bracket can be removed independently of one another.

The ram guides have been arranged to adjust back into the side frames for the removal of the ram horizontally. The side frames just clear the ram, preventing over-adjustment of the guides, which would cramp the piston rod. A feature of the design is that the guide-adjusting screws are threaded through nuts set in open pockets in the side frame. This arrangement permits damaged screws to be removed by cutting out the nut with an acetylene torch without disturbing the ram or guides.

The ram guides are rectangular in section and of forged steel. Each is held in place by a central pull-bolt that draws the guide back against three adjusting screws or push-bolts. These screws bear on hardened tool-steel plugs inserted in the back of the guide. One push-bolt is located above and two push bolts below the pull-bolt; and it is claimed that this arrangement prevents bending at the point of greatest shock, and so reduces the possibility of breaking the guides. The hammers are built in sizes ranging from 800 to 20,000 lb. capacity.

American Gasoline Locomotive

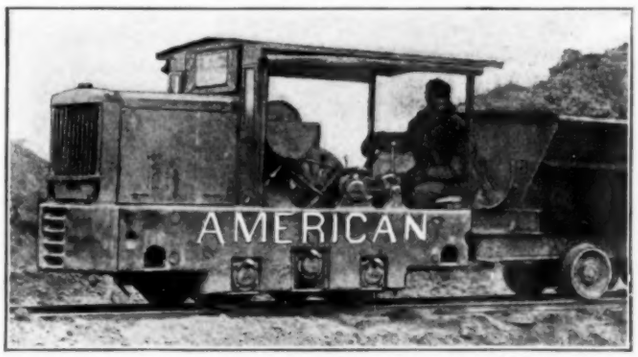
The Hadfield-Penfield Steel Co., Bucyrus, Ohio, has recently placed on the market the American gasoline locomotive. The machine is intended for light haulage purposes where steel rails are provided, being intended

for industrial and construction work, as in steel plants, brick yards, quarries and coal mines, the illustration showing it hauling a train of side-dumping cars. The machine is built in several gages and sizes from 4 to 7 tons, and can be furnished either in the standard or in the low-built design suitable for mine use.

The locomotive is driven by a heavy-duty Hercules, 4-cylinder, 4-cycle, gasoline engine. The engine used for the 4-ton machine has a piston displacement of 226.42 cu.in. and develops 23 hp. at 1,000 r.p.m. It has a 5-bearing crankshaft, and is provided with a force-feed oiling system. A pump is provided to circulate the water in the cooling system and a tubular radiator is used.

The drive from the motor is through friction disks, by means of which the speed can be varied and the direction of travel reversed. The disk shafts are supported on New Departure double-row ball bearings and Hyatt roller bearings, ball thrust bearings being used. The speed can be varied by means of the lever placed directly in front of the operator. The jack shaft is driven by means of a roller chain, and it in turn drives all four wheels. The wheels are 18 in. in diameter, being cast iron with chilled treads, while the axles are 3 in. in diameter. The brakes are applied, of course, upon all four wheels, a pull of 50 lb. upon the lever being sufficient to lock the wheels.

The frame of the machine is built up of four cast-iron sections bolted together. The various units are so placed upon the frame as to make a compact arrangement. The operator's position is covered by means of a cab, which is provided with a small window in the front and can be completely enclosed if desired. The gasoline tank is located at the front of the cab, but is filled from the outside of it. Sand boxes are placed at the end of the gasoline tank, so that the sand can be easily distributed to all four wheels.



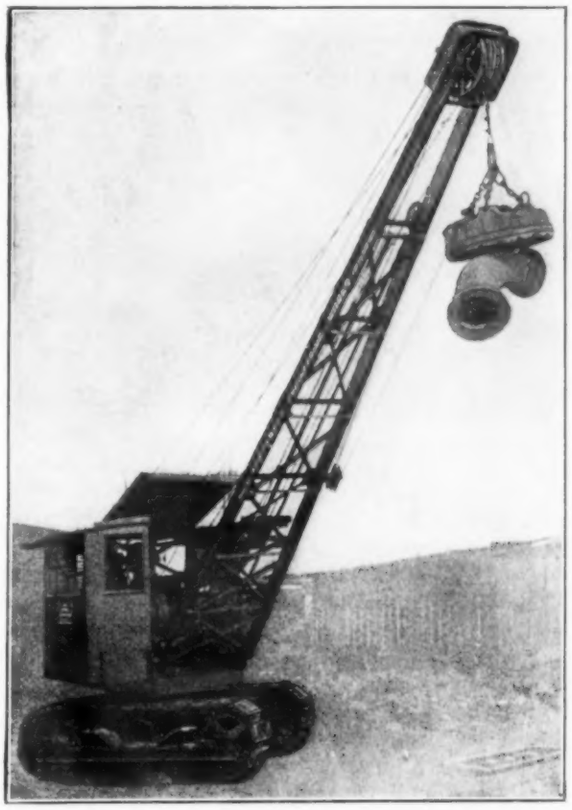
AMERICAN GASOLINE LOCOMOTIVE

Specifications of 4-ton locomotive: Length, 122 in. Height: over cab, 72 in.; without cab, 56½ in. Wheel base, 39 in. Gage, 24 to 56½ in. Width, 50 to 63 in. Speed, to 12 m. per hour. Motor: Hp., 23; speed, 1,000 r.p.m.; drawbar pull, 1,600 lb. Weight, 4 tons.

Northwest Crawler-Type Industrial Crane

The Northwest Engineering Works, 28 E. Jackson Blvd., Chicago, Ill., has put on the market the crawler type industrial crane shown in the illustration. The crane is rated at 10-ton capacity with the load at a boom radius of 12 ft. It is self-contained, being driven by a four-cylinder, 60-hp. engine. This engine also drives a generating set for the operation of an electric lift magnet, when the latter is required. One advantage claimed for this type of crane is that it can travel anywhere in a storage yard and is not limited in its field to the points that can be reached from tracks.

The steering is accomplished by a single control lever,



NORTHWEST CRAWLER-TYPE CRANE EQUIPPED WITH ELECTRIC LIFT MAGNET

by means of which the relative speeds of the two crawlers are varied. It is stated that the machine has sufficient tractive strength to effectively handle a string of several railroad cars. The crawlers are made of manganese steel castings. All bearings are either self-aligning ball bearings or bronze bushings.

The crane can also be used to operate a one-cubic-yard, clamshell bucket, a pile-driver hammer or a wood grapple. Its capacity at its maximum radius of 30 ft. is 5,200 lb.

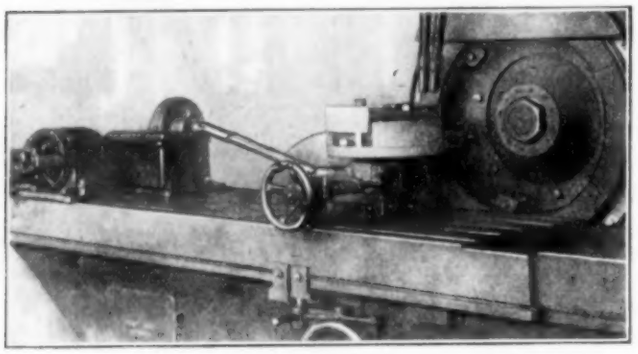
Diamond Rotary Grinding Fixture

The Diamond Machine Co., 9 Codding St., Providence, R. I., has developed a fixture for use on its heavy-duty face-grinding machine. The device is intended for holding circular work while the periphery is being finished, and it can also be used for such work as grinding crowned pulleys. The fixture consists of two units, a plate mounted on a vertical spindle for holding the work, and an electric motor with reduction gearing for revolving it. The spindle is of suitable diameter to fit the hole in the hub of the pulley. A pin inserted between the spokes serves as a driving dog, but with a small change the fixture can be adapted to handling webbed pulleys.

Pulley castings and similar pieces are usually very thin, often chilled, and frequently hard to machine by means of cutting tools, being particularly adapted to grinding. The accompanying illustration shows the fixture used for the grinding of the periphery of a malleable-iron brake shoe, although such things as

rollers for conveyors, wheels for small trucks and pulleys can be finished.

The crowning of pulleys is accomplished at one setting of the work, it being unnecessary to tilt the work to obtain the necessary slant on the face. Referring



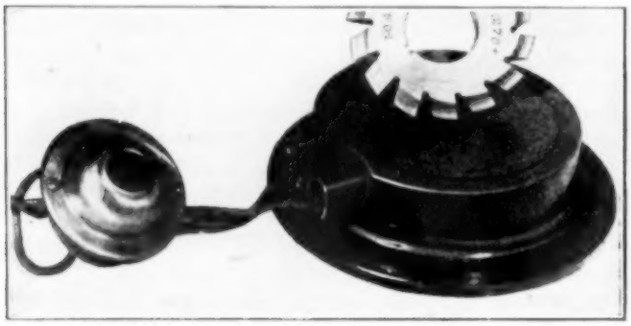
DIAMOND ROTARY GRINDING FIXTURE

to the illustration, if the work be positioned directly in front of the face of the wheel, the surface ground will be parallel with the axis of the cylinder being finished. If it be moved away from the center of the wheel so that it makes contact with the outside edge of it, then the surface ground will be hollow or concave, making a shallow-grooved pulley. By moving the work toward the center of the wheel, so that it makes contact with the inside edge of it, a crown is formed on the periphery, the amount of the curvature depending upon the relative positions of the work and the wheel, it being a maximum and having the same curvature as the inside edge of the wheel when the work is actually inside the wheel.

It is necessary that the edges of the work be finished sufficiently to permit of their correct fitting on the fixture. The production is stated to be high, pulleys 12 in. in diameter and having faces 4 in. wide being ground in two or three minutes; and 24 x 8-in. pulleys in about 7 minutes. Widths of face as high as 10 in. can be handled.

Liberty Universal Magnet

The Liberty Engineering Co., Danbury, Conn., has placed on the market a magnet, shown in the illustration, for both magnetizing and demagnetizing. It is stated that the magnet will work equally well on large or small pieces, either a large block of steel or a watch being totally demagnetized by its use. The magnet



LIBERTY UNIVERSAL MAGNET

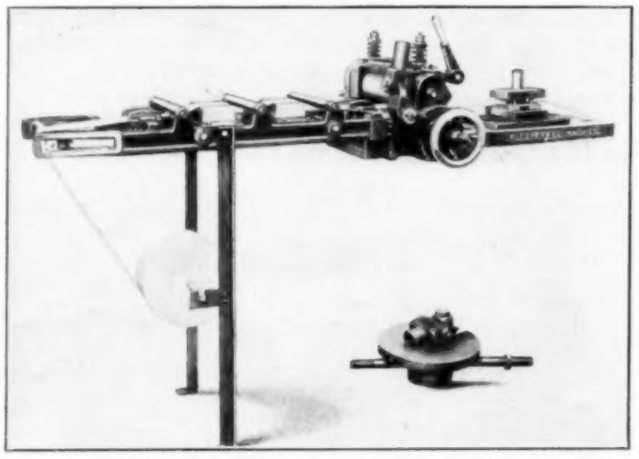
operates on either a 110- or 220- volt alternating current for demagnetizing; and by the use of a quick-acting safety switch, iron and steel may be magnetized to a strong degree by the same current. Should it be desired to make the work a powerful magnet, a direct-current circuit of 110 volts is employed.

It is stated that the apparatus is absolutely fool proof. To operate, the plug is inserted into a light socket, and by pressing the button and passing the piece to be demagnetized over the face of the magnet, the magnetism may be removed from the work. The circuit is automatically broken when the hand releases the button. To magnetize the work, the button is pressed for a period of three seconds, using direct current.

It is stated that the apparatus can be readily adapted to commercial de-magnetizing by placing an inclined brass trough over it, so that the work will slide down over the top plate. As a magnetizer, it may be used in connection with deep-hole drilling, assembling work of various kinds, and to hold screws or articles while inspecting. The magnet is 6 in. in diameter by 1⅜ in. high. It weighs 3 lb. The switch and plugs, as well as 5 ft. of cord, are furnished.

Littell Automatic Paper-Feeding Attachment for Punch Presses

The illustration shows an attachment for automatically feeding paper to a punch press, the device being built by the F. J. Littell Machine Co., 4125 Ravenswood



LITTELL ATTACHMENT FOR AUTOMATICALLY FEEDING PAPER TO A PUNCH PRESS

Ave., Chicago, Ill. The feeding rolls are similar to those that were described on page 209 of the *American Machinist*, and the crank for mounting on the end of the press crankshaft, shown lying on the floor, is also similar in construction to the one there described.

The roll of paper stock is mounted on a mandrel supported by brackets on the legs. The strip of paper passes over an adjustable tensioning roller at the extreme left of the attachment and is led through a pair of adjustable angle-iron guides. It then passes under the series of three rollers that are mounted on the top of the extension. These rollers are loose in their trunnions and serve to cause the paper to rest with the necessary pressure on the two blocks of paraffin wax located between the rollers. The arrangement gives to the paper strip a thin coating of paraffin as it passes to the dies, and the paraffin there acts as a lubricant that permits the punching to be drawn into cup-like form without cracking the paper. The automatic feeding rolls can be adjusted for feeding the proper lengths of stock for each stroke of the die.

NEWS SECTION

Senator Edge Speaks on the Future of Our Foreign Trade

The following is an abstract of a statement issued by U. S. Senator Walter E. Edge of New Jersey on the formation of the Foreign Trade Financing Corporation:

"As an ardent advocate of the stimulation of world-wide trade for the United States, and incidentally as the author of the amendment to the Federal Reserve act providing for the formation of corporations to extend long-term credits to foreign purchasers of American goods, I am highly gratified and interested to watch the steps being taken in the formation of the Foreign Trade Financing Corporation.

"The establishment of this corporation is of wide significance to the United States. It offers opportunities for reviving and strengthening American commerce and giving to Europe, China, Australia, Brazil and other foreign countries the raw materials and manufactured articles they need, not by any act of charity or through American Government channels, but as a straight business proposition.

"One of my chief interests is to get the government *out* of business and this corporation will help largely to get the government out of business. Our foreign trade must be financed. There is no question as to whether there shall be foreign trade. There must be, both for the welfare of this country with its raw materials and manufactures now collecting here far in excess of our ability to use them, and for the welfare of the rest of the world which needs our surplus. Our merchant marine must be used to carry our goods to all the ports of the world and bring back goods in return.

"No matter how much money or credit the United States may lend to Europe either through private or government channels, we are not going to encourage or stimulate foreign purchasing if we impose an embargo against imports from other lands. If the American producer needs help, don't let us hand him a pair of broken crutches. And it must be remembered that our imports will help pay for the goods we send abroad, will help to restore foreign exchange to a reasonable basis, and indirectly will help Europe to curtail its indebtedness.

"It has been said when this general subject has been under discussion on the floor of the Senate that the producers were not taking advantage of the export finance act because only two or three corporations had been organized under it. The answer is that up to a very few months ago producers and business men in general did not feel the actual pressing necessity of looking out for trade. We still were living in that fools' paradise of large profits made during and immediately following the war, and there was little inspiration or apparent necessity to provide investment capital for such a purpose; the full pains of readjustment and deflation had not yet been felt. But in the past few months, since conditions have materially changed, orders for goods have fallen off.

"However, as I have frankly stated, this export financing activity will not alone solve the problem. A wise, carefully considered policy on the tariff as it relates to exports and markets may well go side by side with this credit-supporting instrument. The policy though must be most carefully considered, and from every possible angle. Hurried legislation will harm more than help, and just to pass a haphazard "tariff bill," especially in such an emergency and crisis, may give a black eye to the American tariff policy.

"For one thing, we must carefully consider just what retaliatory measures a high protective tariff at this time may invite from most countries which already are buying our goods or are disposed to buy them. We must consider whether the additional income we might receive from an emergency tariff will compensate the American government, American business, and the American people at large for an inevitable falling off of imports. We must consider whether, through this method, we can artificially raise the prices to the producer and still find him a market abroad or even at home, even if we do manage to keep his competitors out of this country. We can not consume all we produce and the surplus must be sold outside our own country, and it is manifest that we cannot sell it at prices established by ourselves if these prices are higher than general world prices."

Australian Trade Outlook Improving

Australia has been forced to curtail its imports for the time being because of the unfavorable position of its exchange on the London market. The charge for remitting Australian funds to London has at times reached 4 per cent owing to the fact that credits held in London for Australian accounts have been depleted by heavy shipments of merchandise to the commonwealth, while exports from Australia have been below normal and payments for these exports have been deferred.

The Australian government figures for the first two months of the present fiscal year, which began July 1, 1920, show that imports exceeded exports by almost £7,000,000, while the exact reverse of this situation was the case during the same period of the previous fiscal year. Figures for New South Wales for the month of September indicate a still greater excess of imports over exports for that month and customs returns for later months show the same trend. During the last six months of 1920 Australia's exports were unusually small, due to the stagnation in the wool and other raw material markets. This situation is now improving rapidly, however, and in addition the commonwealth is now in a position to ship wheat.

A factor in the situation that should not be overlooked is that in the majority of cases shipments now being made are on a 90-day basis and therefore the effect of this merchandise movement has not been apparent on the exchange market. When wheat and wool were under government control payment was made upon shipment.

The commonwealth has just harvested a bumper wheat crop, the demand for its wool and other raw materials is improving steadily. Australia is planning to increase its exports and to cement its commercial relations with the United States in various ways. It needs farm equipment, industrial machinery and manufactures of all kinds and these will be purchased in this country to the same extent that Australian products find a market here.—From the *World's Markets*, published by R. G. Dun & Co.

Business Conditions as the Big Banks of the Country See Them

National City Bank of Chicago Comments on Price Readjustment and Railroad Conditions

Further recessions in prices is enabling the country to do more business with much less money than was required one year ago and systematic liquidation by retailers everywhere is relieving the credit strain. When this movement runs its course, there must be an important revival in business, because there is no unwieldly supply of merchandise overhanging the market at this time. A recent investigation shows that prominent bankers, business men and financial experts are looking for a turn in the business situation during April or May. Under such conditions as exist today no one can call the turn exactly, but the outstanding fact is that the people are doing now the one thing needed to put the country upon its feet and impart new life to general trade. Continuance of war prices for merchandise in peace times was just as impracticable as was the maintenance of $3 wheat or 40c. cotton. The test came and the law of supply and demand was vindicated as usual and now the buyer is in the saddle again which is his normal place.

Readjustments of Prices

General business is being made infinitely safer by the readjustment which is restoring the country's industrial corporations and business firms to their normal position. Sixteen copper companies have passed their dividends and two more have reduced them. Four hundred million pounds of copper have been provided for through a pooling arrangement which will rank among the most ingenious devices of reconstruction finance. It is difficult to see how such a transaction would avail in the case of cotton, wheat, or other commodities, for the production of copper is concentrated largely in the hands of important producers who are well fortified to carry out the engagements which this unique arrangement entails. As compared with one year ago the situation is very much stronger, for then producers and many consumers were living in a fool's Paradise and making themselves believe that a $5 bill was the lowest unit of value worth thinking about. Business improvement is slow as the deflation process usually is, but each day brings some progress, and a recent tabulation shows about sixty-nine recessions in wholesale commodity quotations against twenty-five advances. The present average of steel prices is the lowest since the summer of 1916, for eight of the principal iron and steel products now average $61.72 a ton as against a high quotation last year of $85.03 a ton. Encouraging as this showing is, a comparison shows that the current quotation is still more than 70 per cent above the average level prevailing in August, 1913. There is good basis for the theory that the corner has been turned in some branches and that as compared with conditions existing three or four months ago, the improvement is fairly satisfactory.

Condition of the Railroads

The move made by the railroads to abrogate national wage agreements in the effort to lower operating expenses has directed attention to the status of the wage question in all industries. In a season of vanishing profits, it is clear that labor must contribute its share toward reducing the high cost of living which the people of the entire world will no longer tolerate. Railroad managers have given interesting testimony before the Railroad Labor Board touching the injustice of some of the labor rules which they are working under and representatives of the employees have made strong representations on the other side. This agitation has brought up some interesting problems, and there is no doubt but that the controversy will be threshed out and justice done in the final analysis. It is too early to judge the ultimate effect of this controversy, but it will be helpful in emphasizing the increased labor costs in all industries. The one thing sure is that the railroads cannot further advance passenger and freight rates, for in the judgment of many experts the industry has now as high rates as can prevail without reducing the volume of traffic.

National City Bank of New York Reports Little Change in Business Situation

The general business situation has changed but little during the past month. In the Middle-West the movement of grain to market has continued at a moderate rate, and prices have been stronger. Receipts of live stock at the principal markets have been comparatively light, which has helped to sustain prices and they have recovered slightly. Cotton has been weak and at the close of the month was lower than at any time since 1915, when it was recovering from the great slump that followed the big crop of 1914 and the outbreak of the war. The March delivery in New York has touched 12.25, with the spot price in several Southern markets below 12 cents. This compares with 40 cents a pound one year ago. Naturally the cotton-growing section is not cheerful. Foreign markets are very much depressed, with Liverpool below New York.

Plenty of Retail Trade

The industrial situation is mixed, the news from day to day telling of works that are closing and works that are starting up, the one class of reports apparently about balancing the other. The amount of unemployment unquestionably is very large, but the amount of distress reported is comparatively small, indicating that the wage-earners had laid by something in the day of good earnings. The volume of retail trade in the industrial cities supports this view, but trade in the rural districts is light, bank clearings are down 25 to 30 per cent from a year ago, which, however, is not very bad considering the lower prices. Railroad tonnage is off about 20 per cent from the high point in October. The number of idle cars approaches 400,000. The movement of coal, grain, oil, lumber and all the chief commodities is light. The export business in coal to Europe is dead for the time being and the domestic coal trade is flat, with a good many mines on part time and keen competition among sellers.

Prices Slowly Receding

All commodities are being brought into the movement toward a lower level of prices although as a rule those that have been under pressure longest are fairly well stabilized. Crude oil has declined rapidly since the first of the year and is down about 50 per cent. All of the metals are at the lowest point yet touched. Sugar has recovered about a cent a pound under the influence of an arrangement in Cuba to market the crop through a selling committee representing planters, bankers and the Cuban government. The automobile industry is showing greater activity. Wage reductions are occurring generally and are accepted usually in good spirit.

Reports by cable to this bank from its foreign branches and agencies indicate practically no change in conditions during the past month. In Europe there is much anxiety over the question of reparations.

Guaranty Trust Co. of New York Notes Improvement in Financial and Business Conditions in the United States

The improvement in trade and industry continues, with some evidences of the interaction of recuperative forces. Middle-West wholesale and retail business is gaining conservatively, better prices for wheat, corn and oats being responsible for larger sales of textiles and related commodities at the trade centers. While the buying is of the small-lot variety and indicative of the feeling that prices have not yet reached bottom levels it is sufficient to encourage Eastern manufacturers. In New England shoe, cotton textile, woolen and worsted mills are gradually responding to the renewed demand for their products. Reopenings and extension of working days are accompanied by wage reductions and elimination of bonus payments, these in turn being offset by readjustments in the workers' favor. Decreases in unemployment at the industrial centers are exerting a stabilizing influence.

Employment Increasing

The Bureau of Labor Statistics of the Department of Commerce reports an improvement in the employment situation during January over December. Twelve out of thirteen industries surveyed showed a decrease in the number of unemployed, the decrease being most notable in the boot and shoe industry. There were increases in unemployment in the men's clothing trade and automobile manufacturing. Decreases in wages occurred in the bituminous coal, iron and steel, and carbuilding and repairing industries.

The Chamber of Commerce of the United States declares that the sentiment for a spring revival is growing, but warns that no sudden leap forward should be expected. Farmers are less recalcitrant and while grain and live stock shipments are only fair, the fruit and vegetable movements are heavy. Building continues at a standstill, but there is more work in the industrial sections.

While the improvement from week to week is slow, a comparison with the situation four months ago yields encouragement. Over that period the replenishment of stocks has proceeded steadily and in sufficient volume to prevent widespread distress. No disposition to anticipate future needs is observable, but that would quickly manifest itself, in the opinion of producers, should the way be opened for an influx of foreign orders.

Prices

During the last fortnight price fluctuations have covered a narrow range, the tendency being on the whole downward but with constantly diminishing speed. Wheat, corn and oats have shown a disposition to go up, and beef, pork, copper, tin and steel are without notable change, but other commodities show measurable declines from the high points of the present year as well as from those of the corresponding period of 1920. As for the margin between wholesale and retail prices, a statement by the Department of Labor shows that while wholesale prices of 327 selected commodities fell off 6½ per cent in January, as compared with December, the retail prices of 43 household commodities in 51 cities showed a decline of 3 per cent. On this same basis a decline of 28½ per cent in wholesale prices has occurred within the year, while the retail price decline for the same period was 14 per cent. Both wholesale and retail prices in January last were about 75 per cent higher than in January, 1913.

Steel Prices Reduced

In an effort to stimulate buying a number of independent steel companies have within the last two weeks quoted prices which, as announced, were at the level of those adhered to by the United States Steel Corporation. It is declared that in a number of instances quotations even lower than the standard prices have been made. The effect has been twofold. Some increases in small orders resulted immediately upon the announcement of reduced prices. The second effect, however, was to deter buyers. The latter seem to have withheld orders on the expectation of a downward movement of U. S. Steel Corporation prices to meet the conditions of such an open market as the independents have precipitated. No announcement of such an intention has come from the U. S. Steel Corporation, however, and apparently for the reason that the stimulating effect upon buyers of price reductions under present conditions is doubted. The lowered price quotations have been followed by wage reductions in a number of instances.

The monthly report of the United States Steel Corporation for January showed unfilled orders amounting to 7,573,164 tons, a decline of 574,958 tons from the December figure. The January total of unfinished business is the lowest since November, 1919.

Foreign Exchange

Pending the expected settlement of the question of German reparations, a dominating factor, the foreign exchange market has been irregular during the last fortnight, with a tendency to dullness. Sterling early last week sold at $3.92¼ to the pound, the highest price obtained since last July, but closed the week below the high of the preceding week. With the exception of Copenhagen and Christiania crowns and Austrian kronen, the last of which showed no change, all European exchanges ranged higher last week than the week before, a situation which in some quarters was interpreted as indicative of a more hopeful feeling regarding Europe's progress toward normal conditions. During the last two weeks Sterling has ranged from 3.83¼ to 3.92¼, as compared with a range of from 3.35¼ to 3.47¼ during the corresponding period a year ago. This market is being observed closely at the present time because of Great Britain's announced intention to pay the interest on her American debt during the current year and the consequent probability that Sterling bills in large quantities will be offered here for the purpose of accumulating dollars.

International C. of C. To Meet in London in June

"The Restoration of the World's Commerce" will be the general subject taken up at the first annual meeting of the International Chamber of Commerce, in London, during the week beginning June 27.

Arrangements are being made for a program of general sessions and group meetings to discuss international economic problems in the fields of finance, ocean and land transportation, communication, production and distribution, and restoration of the devastated areas. All of these topics will be approached with a view to relating them to the central theme.

The International Chamber was organized at Paris last year by representatives from Belgium, France, Great Britain, Italy and the United States. The American Section has been organized for some time with offices at the headquarters of the Chamber of Commerce of the United States in Washington.

The American representatives have proposed a number of amendments to the constitution designed to facilitate operation of the International Chamber, and to expand the organization. These will be considered at the meeting in London.

A part of the London program is the presentation of authoritative statements regarding economic conditions and their international aspects with respect to all countries.

At the annual meeting of the Chamber of Commerce of the United States to be held in Atlantic City, April 27 to 29, a group session will be held at which there will be completed plans for American participation in the London conference, and at which the subjects proposed for the London meeting will be gone over.

American C. of C. in Berlin Opens Office in New York

In order to be prepared for the time when American foreign trade will again approach its pre-war volume and to pave the way for a concentration of efforts in this direction, the American Chamber of Commerce in Berlin established some months ago in New York a branch office and bureau of information which has been of practical aid to exporters and importers in an effort to revive trade with Germany.

This office is situated at 1939 Park Row Building and S. George Fremont is secretary and manager. All communications should be addressed to him.

Decrease in Exports of Metal-Working Machinery

Metal-working machinery to the extent of $44,312,233 was exported during the calendar year of 1920, according to the figures of the Bureau of Foreign and Domestic Commerce. The bureau divides that total as follows: Lathes, $7,575,123; other machine tools, $13,961,243; sharpening and grinding machines, $3,945,490. The total is considerably less than the exports during 1919 when metal-working machinery to the value of $58,507,942 was exported. In 1918 the exports aggregated $51,620,297.

The principal decreases came in the business with the United Kingdom, France, and Japan. Sales to the United Kingdom during 1920 totaled $11,135,567. This is a decrease from $15,221,946 in 1919 and from $19,296,903 in 1918. The exports to France were $7,595,733 in 1920, which compares with $15,785,280 in 1919. In 1920 the sales to Japan totaled 4,250,583. This compares with $5,383,184 in 1919.

There were a few instances in 1920 where exports increased. Exports to Canada in 1920 aggregated $5,815,314. This compares with $4,034,646 in 1919. Exports to Cuba showed a decided gain in 1920. Metal-working machinery sent to that island in 1920 was valued at $1,218,869. In 1919 total sales were $737,238, while in 1918 the exports to Cuba were valued at $309,618. Exports to British India in 1920 were $1,374,068. In 1919 the value of the exports was $900,429. The 1920 exports to countries not mentioned above were valued as follows: Belgium, $1,920,172; Italy, $1,614,818; Norway, $158,200; Spain, $1,144,844; Sweden, $446,787; Mexico, $610,572; Brazil, $455,184; Chile, $443,257; China, $932,351; Australia, $885,490; other countries, $4,310,424.

J. N. Ding in the New York Tribune

Harding Urged to Choose Ministers from Our Diplomatic Service

In an effort to make of the foreign service of our government a career which will attract the services of able and ambitious men the National Foreign Trade Council has written to President-elect Harding urging that a generous portion of the appointments to the rank of ambassador and minister be reserved for well-qualified officials already in the diplomatic and consular services.

The letter, which is signed by James A. Farrell, chairman of the council and president of the U. S. Steel Corporation, states:

"The importance to American foreign trade of able and experienced diplomatic representation is too apparent to require exposition.

"The practice of appointing ambassadors and ministers from the country at large has given this government some of its ablest diplomats.

"As the secretarial grades of the diplomatic service and the entire consular service have for ten years been conducted on the merit system and a large number of well-qualified officials therein desire to make the foreign service their life work the country possesses a resource of experience and ability which should be fully utilized.

"As a means of practically combining the method of general appointment with the principle of a permanent diplomatic service we venture to suggest that in the forthcoming appointments a generous proportion of the embassies and legations be reserved for appointments from the diplomatic and consular services, or those with previous creditable service therein."

This subject of securing the development of a foreign service adequate to the increasing demands and responsibilities of our expanded foreign trade will be considered in detail at the Eighth National Foreign Trade Convention, to be held in Cleveland, Ohio, May 4, 5, 6, 7, 1921.

N. M. T. A. Announces 1921 Convention Features

Announcement has just been made of the tentative program for the annual convention of the National Metal Trades Association, which will be held at the Hotel Astor, New York, on April 18, 19, 20 and 21.

On Monday the 18th there will be a meeting of the Executive Committee; meeting of local secretaries; and a dinner of the secretaries.

On Tuesday the 19th a meeting of the Administrative Council will start the day's proceedings. A joint luncheon of the presidents, secretaries and the council, and an alumni banquet in the evening will constitute the rest of the day's work.

Wednesday and Thursday (the 20th and 21st) will be convention days, with a theater party for the ladies on Wednesday afternoon and the convention banquet on the same evening.

Business Items

The Nash Engineering Co., with a plant on Wilson Road, South Norwalk, Conn., has recently been incorporated under the laws of Connecticut, with a capital stock of $500,000, to carry on the machine business of the present company. The incorporators are: E. Kraychie, 326 Crescent St., Astoria, Long Island, N. Y.; H. G. Liese, 1259 Lincoln Place, Brooklyn, N. Y., and Arthur Rothstein, 120 Broadway, New York.

The Viking Specialty Co., of Worcester, Mass., has recently been organized and incorporated under the laws of Massachusetts for the manufacture of hardware, tools, etc. The officials of the company are: President, W. R. Smith, of Auburn, Mass.; treasurer, William E. Gifford, Worcester, and clerk, Frederick A. Nelson, Worcester. The concern is now looking for a suitable building prior to commencing operations.

The combined companies of the Reed-Prentice Co. and the Whitcomb-Blaisdell Machine Tool Co., both of Worcester, Mass., and the Becker Milling Machine Co., of Hyde Park, Boston, have decided to close their sales offices and display room opened last year at 26 North Clinton St., Chicago. Their lines will again be marketed by general dealers in the Chicago territory.

The Stewart Manufacturing Corporation, 4500 Fullerton Ave., Chicago, Ill., manufacturer of die-molded castings and bronze-back bearings, announces the establishment of a permanent Cleveland office at 419 Bangor Building, 942 Prospect Ave. E. P. Grismer, who has been long identified with this industry, will be in charge of the Cleveland territory.

At the annual meeting of the New Britain Tool Manufacturing Co., New Britain, Conn., held recently the following officers were elected: President and treasurer, C. Adrian Carlson; vice-president, Rudolph Sandberg; assistant treasurer, Carl Hammar; secretary, Harold Johnson; assistant secretary, Julie S. Joplowitz.

The Gill Piston Ring Co., of Hartford, Conn., has recently been organized and incorporated under the laws of Connecticut to engage in the manufacture of piston rings, machinery, etc. The incorporators are: L. F. Robinson, 45 Forest St.; Francis W. Cole, 28 Atwood St., and Attorney F. E. Jones, 11 Central Row, all of Hartford, Conn.

Landers, Frary & Clark, of New Britain, Conn., has recently purchased a block of capital stock of the Stanley Insulating Co., of Great Barrington, Mass.

Allen & Co., Inc., of New Haven, Conn., has recently been organized and incorporated to deal in hardware, tools, factory supplies, etc. The capital stock of the new concern is $35,000, and the incorporators are: Ralph Allen, of Shelton, Conn.; William Hargraves, of Derby, Conn., and J. A. Kader, of New Haven.

The Gardner Machine Co., Beloit, Wis., announces that it has discontinued its Chicago branch office and has appointed the Federal Machinery Sales Co., 12 N. Jefferson St., Chicago, to act as its agent for disk grinding and polishing machines.

The Wickwire-Spencer Steel Corporation of Worcester, Mass., has changed the name of its factory paper from the "Triangle Clan" to the "Triangle News." The "News" covers the factories located in Worcester, Mass.; Palmer, Mass., and in Spencer, Mass.

The Acme Wire Co., of New Haven, Conn., has recently issued $500,000 additional preferred stock and $9,700 additional common stock to the present capital of the company. The company has a large plant on Dixwell Ave., New Haven, Conn.

The Smith Engineering Co. announces its organization and the opening of its engineering and designing office at 1 Union Square, New York, for the conducting of a reliable mechanical engineering and contracting service.

The Worcester Stamped Metal Co., 9 Hunt St., Worcester, Mass., has opened a branch office in the Bailey Building, Room 308, Chestnut St., Philadelphia, Pa. The office is in charge of H. L. Hess, agent.

The Worcester Gear Works, Inc., of Worcester, Mass., whose factory was destroyed by fire in January, has opened its new factory in the Osgood Bradley Building in Worcester, where they have a modern equipped plant.

Machinists employed by the United States Cast Iron Pipe and Foundry Company at Chattanooga, Tenn., were replaced within forty-eight hours, officials of the company stated, when a number of them went on strike.

A new plant for the manufacture of welded steel tubing has been placed in operation at Kenilworth, N. J., by the American Circular Loom Co., for many years manufacturers of thin wall steel tubing used for electric wire conduits.

The Bridgeport Hardware Manufacturing Corporation, Bridgeport, Conn., has recently filed with the Secretary of State an increase of capital stock in the amount of $150,000 additional.

The C. J. Root Co., of Bristol, Conn., manufacturers of brass goods and numbering machines, etc., has recently added $75,000 to the capital stock of the concern.

The Empire State Engine Corporation announces the change of its location from 1261 Broadway to 347 Madison Ave., New York.

Personals

A. W. CLARK has resigned his position as manager of the price and products department of the Yale & Towne Manufacturing Co. of Stamford, Conn. Mr. Clark has been with Yale & Towne for the past thirty-one years.

GEORGE F. WRIGHT, vice-president of the Wickwire-Spencer Steel Corporation of Worcester, Mass., has resigned his position to enter private business.

O. R. SPRAGUE has been appointed district sales manager at Portland, Ore., for the Gilbert & Barker Manufacturing Co. of Springfield, Mass., following the transfer of F. R. Burrows to St. Louis.

ERNEST T. CLARY, assistant general manager and assistant treasurer of the Whitcomb-Blaisdell Machine Tool Co. of Worcester, Mass., has resigned his position with that company. He has been with the concern for the past twelve years.

L. ARTHUR BURTON has recently been appointed to the Boston sales force of the Wickwire-Spencer Steel Corporation of Worcester, Mass. Mr. Burton was formerly located at the Wright works of the company in Worcester.

WILLIAM BACON has been chosen superintendent of production of the Reed-Prentice Co. of Worcester, Mass. Mr. Bacon was formerly superintendent of the Prentice Brothers Co. department of the Reed-Prentice Co.

E. J. SLATTERY has resigned as assistant treasurer of the Stanley Insulating Co. of Great Barrington, Mass. Mr. Slattery will resume his former position with the Finance and Trading Corporation of New York.

O. J. SKINNER has been appointed assistant manager of the Pacific Coast sales division of the Gilbert & Barker Manufacturing Co. of West Springfield, Mass. Mr. Skinner was formerly office manager of the San Francisco office of the company. His headquarters will still be in San Francisco.

KENNETH S. EDWARDS, district superintendent of the Los Angeles district for the Gilbert & Barker Manufacturing Co. of West Springfield, Mass., has been promoted to the position of manager of the Pacific Coast sales division, with headquarters at San Francisco.

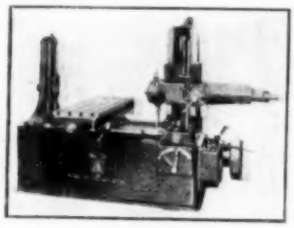
F. E. RHODES of the sales department at the Boston branch office of the combined companies of Reed-Prentice Co. and the Whitcomb-Blaisdell Machine Tool Co., both of Worcester, Mass., and the Becker Milling Machine Co. of Hyde Park, Mass., has resigned his position to take effect at once.

ROBERT C. WELLER has been appointed general sales manager of the Lakewood Engineering Co., with headquarters at Cleveland, Ohio.

Condensed-Clipping Index of Equipment

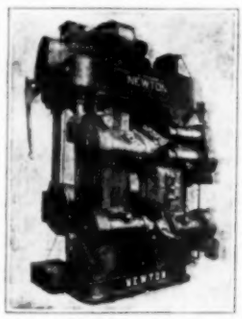
Patented Aug. 20, 1918

Boring, Milling and Drilling Machine, Horizontal, "No. 25"
Giddings & Lewis Machine Tool Co., Fond du Lac, Wis.
"American Machinist," Feb. 3, 1921



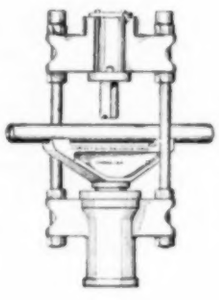
The machiae is intended to be used either for production work or for toolroom work on jigs and fixtures. All control levers are so arranged as to be easily accessible to the operator. Special equipment can be provided. Specifications: Spindle: diameter of bar, 2½ in.; taper hole, No. 4 Morse; longitudinal travel, 13½ in. Vertical adjustment of head on column, 20 in. Maximum distance table to center of spindle, 20 in. Distance from face of spindle to boring-bar support, 48 in. Size of table, 18 x 48 in. Table travel: transverse, 33 in.; longitudinal, 30 in. Spindle speeds: number, 8; range, 12½ to 337½ r.p.m. Feeds in each direction: number, 9; range, 0.0034 to 0.25 in. Driving pulley: size, 16 x 2½ in.; speed, 450 r.p.m. Motor recommended, 3 hp., 1,200 r.p.m., constant-speed. Net weight, 6,300 lb.

Milling Machine, Continuous, Drum Type, "Model O-F"
Newton Machine Tool Works, Inc., 23d and Vine Sts., Philadelphia, Pa.
"American Machinist," Feb. 3, 1921



The machine is intended for finishing two surfaces simultaneously, either on the same or on different castings, being especially adapted to the milling of opposite surfaces of cylinder blocks, parallelism of the surfaces being thus obtained. The bottom of the block is roughed by means of two small face mills and finished by one large one. The roughing cutters are placed at the top, the finishing cutters at the bottom, and the work is removed from and replaced on the rotating drum by an attendant at the rear of the machine, the cutting operation being continuous. Each piece is held by only one clamp, which has a double bearing, thus permitting of speedy operation. It is stated that the average rate of production on the cylinder block shown is 25 pieces per hour.

Press, Hydraulic, "Five-in-One"
The Charles F. Elmes Engineering Works, Morgan and Fulton Sts., Chicago, Ill.
"American Machinist," Feb. 3, 1921

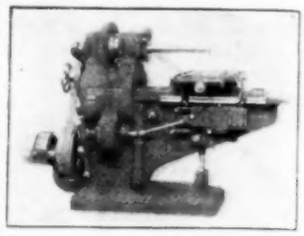


The machine is intended as an all-round press for use in small shops or for repair work. It will handle a large variety of forcing, bending, straightening and broaching work, having a capacity up to 50 tons. On account of its light weight, the machine can be readily handled as a portable press, and used either vertically or horizontally. It can be provided with extension side bars for use when forcing long shafts into or out of gears and pulleys. The press weighs about 500 lb. and has a capacity of 50 tons. The distance between the columns is 18 in., but it may be changed somewhat. The distance from the top-head to the ram lowered is about 20 in.

Broach, Keyway, Staggered-Tooth
Veico Manufacturing Co., Inc., Greenfield, Mass.
"American Machinist," Feb. 3, 1921

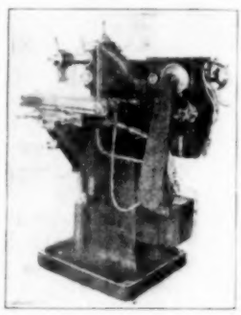
The teeth are milled from solid stock, and are deeply cut to provide chip room, although a strong cross-section is claimed. The depth of the recess makes possible a large radius at the base of the tooth. The tooth faces slant in opposite directions on each side of the bar, thus obtaining a shearing cut, but neutralizing the side thrust on the bar. Because of the shape of the tooth, a large amount of metal can be removed by grinding on the top of it when sharpening, before the rake angle is changed. The broach has a pull shank, which is said to so attach to the broaching machine that it does not pull off-center. The capacity is such that any standard keyway may be cut at a single pass of the broach, which is made in the standard sizes.

Grinding Machine, Cylinder, "No. 55"
Heald Machine Co., Worcester, Mass.
"American Machinist," Feb. 3, 1921



This machine is intended for general repair work, especially the re-grinding of automotive-engine cylinders. It is modeled on the lines of the No. 60 machine, but has been simplified. Specifications: Capacity with standard spindle, to grind holes 2⅞ in. in diameter and larger, by 11 in. long; and 3 in. and larger, by 18 in. long. Standard wheels, 2½, 3 and 3½ in. in diameter. Surface speed of wheels, 4,950 to 5,650 ft. per minute. Vertical adjustment of knee, 2½ in. Transverse adjustment of cross-slide table, 24 in. Cross-slide table: 36 x 18 in.; finished surface, 28 x 14 in. Main table: 55¾ x 16 in.; finished surface, 24 x 12 in. Distance cross-slide table to center of grinding circle, 7 to 9½ in. Speed of driving pulley, 700 r.p.m. Motor recommended: 5 hp.; 1,000 to 1,200 r.p.m. Floor space, 72 x 110 in. Weight: net, 2,900 lb.; boxed, 3,700 lb.

Milling Machine, Plain "No. 2"
The Standard Engineering Works, Pawtucket, R. I.
"American Machinist," Feb. 3, 1921

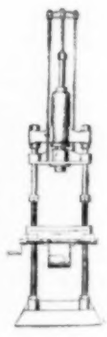


The machine is fitted with positive drive throughout, and is said to be adaptable to all sorts of milling. The table is provided with three T-slots and has oil pockets at each end. The headstock is gibbed to the top of the column, so as to provide for vertical movement, but it can be clamped in any desired position. Twelve spindle speeds are provided, ranging from 80 to 1,950 r.p.m. A power feed attachment can be mounted, thus providing a longitudinal feed for the table of 0.004 to 0.062 in. per revolution of the spindle. Four feed changes, controlled by a single lever, are provided, the gear box being located underneath the speed-change box. The machine is equipped with a Trahern reversible geared pump, having an automatic relief valve. A 1-hp. motor of 1,200 r.p.m. is recommended.

Shim, Laminated, "Fit-All"
The Laminated Shim Co., 47 West 34th St., New York, N. Y.
"American Machinist," Feb. 3, 1921

The shim is made up of thin metal layers, so that by "peeling off" some of them the proper thickness can be obtained. It is called the "Fit-All" because it is adapted to fit nearly all shapes of automotive bearings, it being stated that the shape was decided upon after a study of the shapes of over 1,000 different shims. In some cases it may be necessary to trim the sheet, this being done with a tinner's shears. It is said that this shim combines the advantages of the laminated shim with the universality of the sheet-brass shim. It is made in different thicknesses, and can be furnished punched with holes of two different diameters.

Press, Broaching, Hydraulic, "Rapid"
Charles F. Elmes Engineering Works, Morgan and Fulton Sts., Chicago, Ill.
"American Machinist," Feb. 3, 1921



It is stated that fifteen to twenty-five strokes per minute can be made by this machine. It will take work requiring up to 20 tons pressure. The distance between the columns is 20 in. The platen or table may be raised and lowered quickly by means of the crank at the left of the press, the minimum opening from the ram to the table being 14 in. and the maximum 36 in. A plate set in the platen has an opening through it for the broaches. Below the table is a hopper for receiving the broaches as they pass through the work. The operation of the press is controlled by a single, lever-operated valve, the speed also being regulated by means of a valve.

Clip, paste on 3 x 5-in. cards and file as desired

WALTER G. SCOTT, vice-president of C. E. Knoeppel & Co., industrial engineers, of New York, N. Y., is on a trip through Europe, visiting England, France and Germany. Mr. Scott intends to stay in Europe three months to make himself familiar with the various industrial problems of readjustment and reconstruction occupying this part of the world.

MELVIN W. ELLIS, vice-president and general manager of the Hart-Parr Co., Charles City, Iowa, was elected a director of the Iowa Chamber of Commerce at the recent meeting in Des Moines.

W. W. CLARK, export manager of the Hart-Parr Co., Charles City, Iowa, has just returned from a four months' trip to Sweden, Spain, Denmark, France, Belgium and England in the interests of the Hart-Parr tractor firm.

G. N. JACOBI, SR. has recently been chosen manager of the price bureau department of the Yale & Towne Manufacturing Co. of Stamford, Conn.

Obituary

William D. Forbes

The friends of William Dunderdale Forbes, and they were many, will be deeply grieved to learn of his death, on February 17, at New Orleans, where he has made his home for the past few years. His work as a designer and engineer, as well as a manufacturer of high-grade engines and other products, is well known, his shops in Hoboken, and later in New London, being noted for excellent workmanship.

His career, however, began long before. Born in Perth Amboy, N. J., he went abroad in his youth and living in France at the outbreak of the Franco-Prussian war promptly joined the French colors as a scout. Later he worked with the famous gunsmiths of Switzerland, was on the editorial staff of *Engineering*, of London, under Zerah Colburn, and then returned to this country.

Marine engineering and guns might be said to be his specialties. He did much good work along both lines. But his greatest achievement was his unfailing cheerfulness under difficulties which would have embittered anyone with a smaller spirit. Financial reverses, closely followed by total blindness did not change his attitude toward life and toward his fellow men.

Even when deprived of sight he designed and developed several notable pieces of mechanism, including an automatic rifle which is more simple in construction and in action than any now being made. His wife and daughter were of invaluable assistance in this work, the wife acting as secretary, and the daughter as draftsman. To them he dictated his designs. So accurately was this work done that the machines went together with less difficulty than in many cases where the designer has his vision.

Mr. Forbes soon learned to operate the typewriter, and most of his articles which have appeared in the *American Machinist* during the past three years were typed by him. Of late he had developed a system of making his own drawings, and an article on his method, written by himself, will appear shortly.

To those of us who were privileged to know William D. Forbes, he leaves a lasting impress, and one which cannot fail to be an inspiration as the years go by. Keen, outspoken without being harsh or unkind, courteous and gentlemanly in every way, lending a helping hand to the beginner, giving sound advice freely, his personality will be long remembered. Nor will we forget the faithful and loving care and assistance of his wife and daughter, which filled his years of physical darkness with spiritual sunshine.

FRANK E. LUMMUS, president of the Lummus Gin Co. of Columbus, Ga., operators of foundries and shops which comprise one of the largest gin manufacturing companies in the South, died on Tuesday, Feb. 22, at his Columbus home at the age of 67 years. He had been ill for several months.

LOUIS A. GENDRON, director of the Warren Steam Pump Co. of Warren, Mass., died at St. Vincent's Hospital, Worcester, Mass., Feb. 22, after a short illness. Mr. Gendron had charge of the machine shop of the company and was one of its original organizers in 1897. He was born in Canada in 1849, and came to Warren in 1864.

CHARLES HERBERT TALBOT, purchasing agent of the plants of the General Electric Company in Pittsfield, Mass., since 1904, died at his home in Pittsfield on Feb. 20, after an illness of about four weeks. Mr. Talbot was born in North Dighton, Mass., April 5, 1857. He was well known in industrial circles throughout New England.

Trade Catalogs

Jeffrey Standardized Scraper Conveyors. Jeffrey Manufacturing Co., Columbus, Ohio. Catalog No. 257, eighty-four 8½ x 11-in. pages, describing the latest types of scraper conveyors. The book is profusely illustrated showing the conveyors in action in coal mines, factories and power plants. Several pages of specifications for use of these machines under various conditions are given.

Martell Reamer. Taft-Peirce Manufacturing Co., Woonsocket, R. I. Bulletin No. 112. A book of instruction on how to use the Martell aligning reamer. The various operations are well illustrated and lists of reaming equipment for several auto manufacturing plants are furnished. Bulletin No. 115 is devoted especially to Martell adjustable reamers, their use and special features.

Thread Gages. Taft-Peirce Manufacturing Co., Woonsocket, R. I. Bulletin No. 113, thirty-two 8 x 10-in. pages, containing the important features of the National Screw Threads Commission and their relation to Taft-Peirce Standard gages. Some of the subjects covered are external threads; coarse thread series; fine thread series; S. A. E. and A. S. M. E. standard thread gages; British-Whitworth, International and Lowenherz thread systems; National and American pipe threads. Several valuable tables are included.

Friction Clutches. The Hanson Clutch and Machinery Co., Tiffin, Ohio. Catalog C-3, pp. 80, 6 x 9¼ in. This catalog attempts to show the complete line of Hanson friction clutches, giving its various sizes, weights, dimensions and horsepower.

The Use and Care of the Broach. The Velco Manufacturing Co., Inc., Greenfield, Mass. Booklet, pp. 14, 5 x 7½ in. The purpose of this booklet is to educate the broaching-machine operator and foreman in the proper use of the broaching machine and broaching tools.

The Cooling of Quenching Oil in the Heat Treatment of Steel. The Griscom-Russell Co., 90 West St., New York. Booklet, pp. 29, 6 x 9 in. This booklet describes the necessity for heat treatment, the various quenching mediums and systems commonly used, the advantages of continuous circulation of the medium and the adaptability of the multi-whirl cooler to the cooling of quenching oil.

Operators' Handbook. The Hendey Machine Co., Torrington, Conn. This company has issued a 68-page booklet giving valuable information to operators using the Hendey lathes. This booklet will be sent free to all who use these lathes.

Bakelite. Boonton Rubber Manufacturing Co., Boonton, N. J. Catalog, pp. 48, 8½ x 11 in. This catalog gives an interesting description of its bakelite which is used for electric insulations; also for mechanical, chemical and other purposes. The various departments of the company and its process of manufacturing is profusely illustrated.

Direct-Current Motors. The Mechanical Appliance Co., Milwaukee, Wis. Bulletin No. 401, pp. 15, 8½ x 11 in. This bulletin describes its direct-current motors and gives information pertinent to the selection of its proper equipment.

Alternating-Current Motors. The Mechanical Appliance Co., Milwaukee, Wis. Bulletin No. 461, pp. 14, 8½ x 11 in. This bulletin describes its alternating-current apparatus.

Thread Miller. Taft-Peirce Manufacturing Co., Woonsocket, R. I. Illustrated circular describing two latest types of thread millers—the direct-belt-driven cutter type and the back-gear-driven type.

Line Reaming of Bearings. Bulletin No. 114 issued by the Taft-Peirce Manufacturing Co., Woonsocket, R. I. A well made-up booklet, twelve 8 x 10-in. pages, fully illustrated, describing the Martell system of line reaming bearings. Most of the text is devoted to an explanation of the work of the Martell reamer on airplane motor cylinders.

Forthcoming Meetings

The National Metal Trades Association will hold its annual convention at the Hotel Astor, New York, on April 18, 19, 20, 21. Homer D. Sayre, Peoples Gas Building, Chicago, Ill., is secretary.

The fifth annual convention of the American Gear Manufacturers Association will be held in Cincinnati, Ohio, April 27, 28, 29 and 30.

The annual meeting of the American Welding Society will be held in the Engineering Societies Building, 29 West 39th St., New York, on April 22.

The Society of Industrial Engineers will hold its national convention in Milwaukee, Wis., on April 27, 28 and 29. Geo. C. Dent, 327 So. La Salle St., is business manager.

The National Foreign Trade Council will hold its eighth annual convention in Cleveland, Ohio, on May 4, 5, 6 and 7. J. G. Hammond, care of the Council, 409 Park Bldg., Cleveland, is secretary.

A triple convention of the National Supply and Machinery Dealers' Association, the Southern Supply and Machinery Dealers' Association and the American Supply and Machinery Manufacturers' Association will be held in Atlantic City, N. J., May 16, 17 and 18, 1921, with headquarters for all three associations at the Marlborough-Blenheim. F. D. Mitchell, 4106 Woolworth Building, New York, is secretary of the last-named association.

The spring meeting of the American Society of Mechanical Engineers will be held at the Congress Hotel, Chicago, May 23-26. Calvin W. Rice, Engineering Societies Bldg., 239 West 39th St., New York, is secretary.

The Society of Automotive Engineers, 29 West 39th St., New York announces that its summer meeting will be held at West Baden, Ind., on May 24 to 28 inclusive.

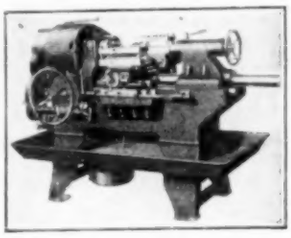
Condensed-Clipping Index of Equipment

Patented Aug. 20, 1918

Lathe, Automatic, Two-Carriage

Rockford Machine Tool Co., Rockford, Ill.

"American Machinist," Feb. 3, 1921

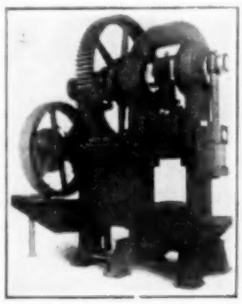


The machine is intended for the rapid production of duplicate parts, especially for the turning of pistons, pulleys, cone pulleys and gear blanks where multiple tools can be used and where the turning and facing operations can be done at the same time. It is said to be built on the lines of a 22-in. heavy-duty lathe. Specifications—Swing: over side carriage bar, 14 in.; over cross carriage, 10¾ in. Distance between centers, maximum, 18 in. Travel of side carriage, 12 in. Spindle bearing: front, 4⅝ x 6¾ in.; rear 3½ x 4½ in. Hole through spindle, 1¼ in. Taper hole in spindle, No. 5. Spindle nose: diameter, 3⅝ in.; length, 2⅝ in.; threads per inch, 5 U. S. S. Tailstock spindle, 2⅞ in. in diameter. Drive pulley, 14 x 6 in. Weight, 3,500 lb.

Press, Trimming, Straight-Side, "No. 6"

Williams, White & Co., Moline, Ill.

"American Machinist," Feb. 3, 1921

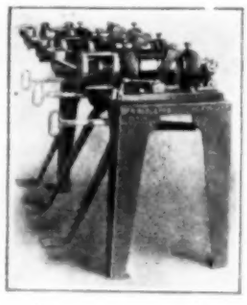


This machine is primarily intended for trimming flashings from drop-hammer forgings, but is also adapted to perforating, blanking, embossing, stamping, etc. The frame is made of semi-steel. The outside slide is of value when auxiliary operations are to be performed. The automatic-stop jaw clutch is said to be of ample dimensions. It has six jaws and is 21 in. in diameter. By means of a screw adjusting mechanism in the pitman the ram can be moved up or down to adjust the die space, as required for the work at hand. When desired the machine can be driven by a motor mounted on the stand at the left. The illustration shows solid frame construction, but the tie-rod construction can be furnished if required or preferred.

Babbitt-Lining Machine, Centrifugal

Ideal Tool and Manufacturing Co., 5825-29 S. Western Ave., Chicago, Ill.

"American Machinist," Feb. 3, 1921

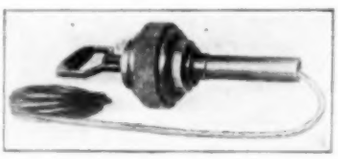


The machine is intended especially for use upon automotive-crankshaft and electric-motor bearings, and is said to have an output of about 700 bearings per day. It is essentially a die-casting machine, but the bushing under treatment is rotated at a speed of 1,800 r.p.m. while the babbitt is cooling. In this way the babbitt is forced against the bronze, the centrifugal force tending to overcome the contracting force due to shrinkage of the babbitt. The machine is provided with three spindles, so that each bearing can be allowed sufficient time to cool before it is removed. The countershaft runs at 600 r.p.m. Floor space, 24 x 28 in.; height, 48 in.; weight, 1,200 lb.

Grinder, Electric, Portable

Forbes & Myers, 172 Union St., Worcester, Mass.

"American Machinist," Feb. 3, 1921



The motor is contained entirely within the spool upon which the wheel is mounted. It is of the three-phase, induction type, the field being rigidly attached to the shaft which, of course, does not rotate. The motor is wound for 110-volt, three-phase current; for higher voltage a simple transformer is provided. The tool is said to be very light in weight in proportion to its capacity. In order to utilize all the weight to the best advantage the wheel flanges and end shields carry magnetic flux, while the end shields are coated with copper and carry electric current also. The wheel is 7 x 2 in. and has safety flanges. The motor gives a maximum output of ¾ hp., the total weight of the grinder being 20 lb.

Drilling Machine, Wheel Rim

The Francis Reed Co., 42 Hammond St., Worcester, Mass.

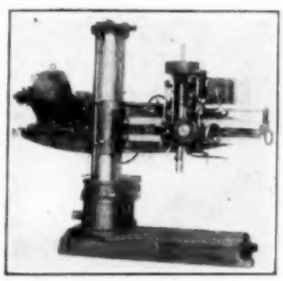
"American Machinist," Feb. 3, 1921

The machine will accommodate any automobile-wheel rim of 20-in. inside diameter or over, but it is adaptable to any regular drilling within its capacity. It will drive drills up to ⅞ in. in diameter. The drive to the spindle is through a 2-in. belt running over idlers on the back of the head. A three-step cone pulley provides for changes of spindle speed. The lower end of the spindle has a No. 2 Morse taper hole. The spindle has a vertical movement of 5 in., and the feed is by rack and pinion operated by a hand lever. The machine will drill to the center of a 24-in. circle. The work table is rectangular, 15 x 17 in., and has a vertical adjustment of 3 in. The machine stands 50 in. high and occupies a floor space of approximately 24 x 80 in. Its weight is 400 lb.

Drilling Machine, Radial, Direct Motor Drive

Fosdick Machine Tool Co., Cincinnati, Ohio

"American Machinist," Feb. 3, 1921

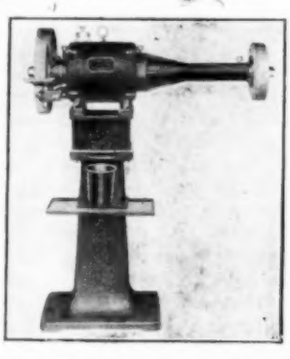


A 5-hp. Robbins & Myers, 3-to-1 variable-speed motor is mounted on an extension of the radial arm on the opposite side of the column from the head. A Cutler-Hammer controller is placed directly on the spindle-head. The drive is adaptable to the 4-, 5- and 6-ft. heavy-duty radial drilling machines made by the concern. A motor of any standard make or speed, but having a 3-to-1 speed ratio, may be used without any change in the mounting. The standard gearing of the machine is used, except in the case of the Bakelite pinion on the motor shaft, the size of which pinion is varied according to the speed of the motor adopted; also it is said that the use of two sets of bevel gears is eliminated, thus saving power. But one motor is used on the machine.

Grinding and Buffing Machine, Combination, Electrical

Cincinnati Electrical Tool Co., 1501 Freeman Ave., Cincinnati, Ohio

"American Machinist," Feb. 3, 1921



The machine is provided with both grinding and buffing wheels, the grinding wheel being adapted to both tool-grinding and general grinding of all kinds. The motors are made for direct or alternate current in ½, 1, 2 and 3 hp. capacities to carry wheels from 8 to 14 in. in diameter. The motor windings and bearings are fully inclosed. Annular ball bearings are fitted on both ends of the armature spindle, as well as on the outer end of the extension spindle. Dust caps, fitted to the spindle, protect the bearings and windings from abrasive dust and dirt. The machine is fully equipped, including toolboard and water pot, and can be furnished without the floor pedestal if desired.

Planer, 7 x 3 x 42-Ft.

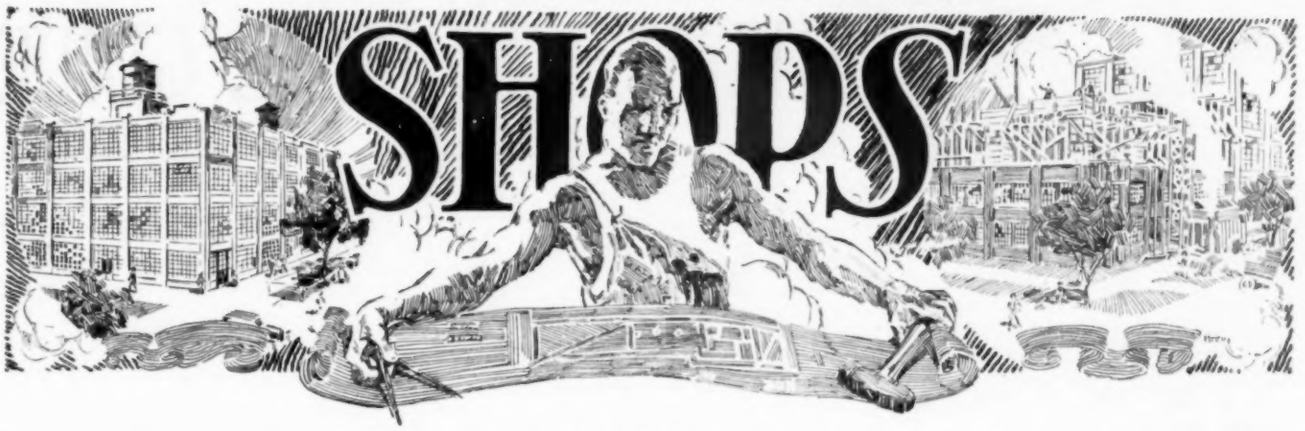
Southwark Foundry and Machine Co., Philadelphia, Pa.

"American Machinist," Feb. 3, 1921

The planer illustrated is one of three that has recently been built for the Baldwin Locomotive Works for heavy-duty service on locomotive frames. It is provided with two heads on the cross-rail, as well as two sideheads fitted to the uprights. Specifications: Capacity: will plane 84 in. in width, 36 in. in height and 42 in. in length. Table: width, 6 ft.; length, 44 ft. Uprights: width of face, 22 in.; depth front to back, 6 ft. 6 in. Cross-rail: face, 26 in.; depth at center, 23 in.; at uprights, 8 in. Table rack: circular pitch, 1¾ in.; face, 14 in. Overall length, 80 ft. Weight, 250,000 lb. Motor, 75 hp.; speed range, 250 to 1,000 r.p.m. Cutting speeds, 20 to 40 ft. per minute.

Clip, paste on 3 x 5-in. cards and file as desired

NEW *and* ENLARGED



Machine Tools Wanted

If in need of machine tools send us a list for publication in this column

Conn., Bridgeport—The Bridgeport Auto Repair Shop, 861 Hallett St.—1 small lathe, 1 drill press, 1 small planer.

Mass., Arlington—A-1 Repair Shop, 28 Brooks St., K. Lutz, Purch. Agt.—one 14 or 15 in. screw cutting lathe, 6 ft. bed, compound rest and taper attachment.

N. Y., Buffalo—The Aldrich Mfg. Co., 55 Illinois St., M. Minor, Purch. Agt.—double trussed steel cornice brake 8 ft. long, (used).

N. Y., Rochester—The Alent Machine Tool Co., 467 St. Paul St., N. Alent, Purch. Agt.—old munition lathe any size and grinders, any model.

N. Y., Rochester—Harrison Machine Co., 146 Platt St., J. Harrison, Purch. Agt.—general machine shop equipment.

Pa., Philadelphia—W. S. Haines & Co., 12th and Buttonwood Sts., manufacturer of heating apparatus—small shaper.

Fla., Live Oak—The Live Oak, Perry & Gulf R.R. Co., C. R. Wadsworth, Supt.—
One planer about 24 x 24 x 6 or 8 in. single head.
One pillow shaper about 18 or 20 in. stroke.
One 24 or 26 in. drill press.

N. C., North Wilkesboro—The Superior "Williams" Mill Co., E. V. Williams, Genl. Mgr.—machinery for the manufacture of burr mills, pattern shop equipment and general machine shop equipment.

Ill., Chicago—The Elgin, Joliet & Eastern Ry. Co., 208 South LaSalle St.—one double axle lathe, center drive, to be No. 3 Niles, Bement Pond as described in their catalog of 1920.

Ill., Chicago Heights—The Amer. Manganese Steel Co., 14th and State Sts.—one or two second hand moulding machines.

Mich., Detroit—C. Cummings, 6051 Brush St.—miscellaneous equipment for finishing automobile bodies.

Mich., Marysville—The Wills Lee Motor Car Co.—drill press and equipment.

O., Cincinnati—Harvey Bros. Tank & Welding Co., 315 East 2d St., A. Harvey, Purch. Agt.—punch, capable of punching $\frac{3}{4}$ in. hole in a $\frac{3}{4}$ in plate, 25 in. throat.

Wis., Jackson—The Meehan Mfg. Co., 709 M. & M. Bldg., W. Richter, Purch. Agt.—pneumatic drills, riveting hammers, grinders, bending roll, also small punch to punch sheets.

Wis., Mellen—W. Willoughby—garage repair machinery.

Wis., Milwaukee—A. W. Hardt, 47th and State Sts.—one 20-24 in. lathe and one 12 in. drill press.

Wis., Milwaukee—A. L. Kiefer Co., 433 Milwaukee St., A. L. Kiefer, Purch. Agt.—sheet metal working machinery.

Wis., Milwaukee—The Nash Motors Co., Clement and Oklahoma Aves., B. W. Twyman, Purch. Agt.—sheet metal working machinery for fenders, etc.

Wis., Wausau—H. L. Mumm & Co., manufacturer of spark plugs—wood-turning lathes and automatic saws.

Ia., Dubuque—The A. Y. McDonald Mfg. Co., 12th and Pine Sts.—one No. 2 Landis pipe threading machine to cut up to 2 in. pipe, (used).

Mo., Joplin—The Joplin Steel & Malleable Co., East 3d St.—foundry equipment.

Mo., St. Louis—The Chester Iron & Fdry. Co., 7800 South Vulcan St., F. Schoen, Purch. Agt.—crane, cupolo, molds, ladles and other equipment for a new foundry.

N. S., Trenton—The Nova Scotia Steel & Coal Co.—equipment for its machine shop, etc.

Ont., Tillbury—The Gove Motor Car Co.—metal working machinery and special equipment for the manufacture of autos and trucks.

Ont., Toronto—The Temiskaming & Northern Ry. Comn., 56 Church St.—$57,524 worth of shop machinery.

Que., Hull—W. Cross, Chelsea Rd.—garage equipment.

Que., Montreal—The Supercharge Engine Co., of Canada Ltd., 120 St. James St.—equipment for its proposed plant.

Machinery Wanted

Md., Easton—The Easton Milling Co., manufacturer of flour, meal, feed, etc., G. L. Bartlett, Pres.—sifters, purifiers, dust collectors and cleaning machinery for wheat.

N. Y., Avon—The Valley Sand & Gravel Co., J. Flynn, Purch. Agt.—stone quarry and gravel machinery.

Ky., Broadhead—D. H. Gray—complete equipment for brick plant, canning factory equipment and machinery for broom factory.

S. C., Greenville—The Peerless Folding Ladder Co.—moulders, lathes, multiple boring machines, saws and other wood-working machinery.

Va., Crozet—The Crozet Pin & Bracket Co., W. P. Bickers, Purch. Agt.—woodturning lathes for turning from square to round, circular and tapered shapes, as spools, pillboxes, threaded caps or cobs for steel insulator pins, etc. Especially interested in machine for making the cobs which are $2\frac{1}{2}$ in. in length, $1\frac{1}{4}$ in. in diameter at one end, straight tapered to 1 in. at the other, has $\frac{5}{8}$ in. hole with internal thread extending 2 in. deep from the center of the large end, and a standard insulator thread on the outside, $2\frac{7}{8}$ in. in length beginning at the small end, the threads being $\frac{1}{8}$ in. in width by $\frac{1}{16}$ in. in depth.

Va., Radford—The Radford Ice Corp., W. L. A. Giesen, Genl. Mgr.—complete refrigeration and cold storage equipment.

W. Va., Point Pleasant—Point Pleasant Lumber Co., W. J. Waldie, Mgr.—combination woodworker.

W. Va., Williamson—The Coalton Coal Corp., J. T. Jones, Cambria, Va., Purch. Agt.—mining machines etc.

Mich., Detroit—A. J. Lauhoff, 2445 Seminole Ave.—sheet metal working equipment including brake, shears, roller, all about 30 in. size.

Mich., Detroit—The Michigan Stamping Co., 3171 Bellevue Ave.—equipment for galvanizing department.

O., Columbus—The Franklin Adis Tile Co., Gugle Bldg., J. J. Morgan, Genl. Mgr.—(two mixers, conveyors, 2 or 3 molding machines and special machinery.

Wis., Antigo—The Langlade Laundry Co.—laundry machinery, etc.

Wis., Kenosha—The Blommer Ice Cream Co., 1502 North Ave., Milwaukee—ice cream making and refrigerating equipment.

Wis., Kenosha—The Kenosha Woodwork Mfg. Co., 259 Valentine St.—wood-working machinery.

Wis., Milwaukee—The Wisconsin Furniture & Millwork Co., 16 Mack Blk.—planer, mortiser, sticker and other wood-working machinery also portable saw-mill.

Wis., Oshkosh—The Fuller Goodman Co., (wood workers), City Natl. Bank Bldg., F. A. Fuller, Purch. Agt.—rip saw, timber sizer, resaw (7 ft. diameter with 8 in. blade) and matcher.

Wis., Racine—The New York Market Co., 1015 6th St.—special machinery.

Wis., Ripon—C. D. Starck and O. H. Kroll, manufacturers of soft drinks and ice cream—machinery to manufacture ice cream also bottling machinery.

Ont., St. Marys—The St. Marys Milling Co.—chopping mill machinery.

Sask., Maskakee Lake—The Maskakee Lake Development Co.—equipment for its proposed evaporation plant.

Metal Working

NEW ENGLAND STATES

Conn., Norwalk—J. S. Fairbanks, 438 Atlantic Ave., Stamford, has awarded the contract for the construction of a 1 story, 50 x 140 ft. service station on West Ave., here. Estimated cost, $25,000. Noted Nov. 11.

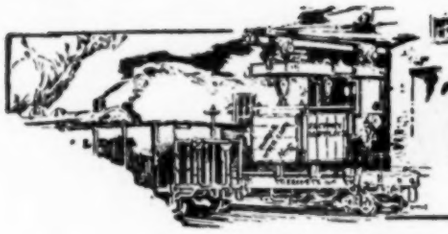
Mass., Boston—T. L. Harkins Machine Co., 44 Farnsworth St., has awarded the contract for the construction of a 2 story, 46 x 91 ft. machine shop at 7-9 Mechanics St. Estimated cost, $30,000.

Mass., Dorchester (Boston P. O.)—H. E. Stevens, 24 Dix St., will soon award the contract for the construction of a 1 story, 60 x 120 ft. garage on Dorchester Ave. Estimated cost, $25,000. Private plans.

N. H., Charlestown—The Bowen Motor Co., will soon award the contract for the construction of a 2 story, 60 x 165 ft. garage. Estimated cost, $100,000. G. W. Griffin, 72 North Main St., Concord, Archt.

N. H., Hanover—H. H. Downing, Littleton, has awarded the contract for the construction of a 2 story, 60 x 80 ft. garage on Cottage St., here. Estimated cost, $30,000. Noted Feb. 3.

R. I., Providence—S. Bomes, 71 Farragut Ave., plans to build a 1 story garage and service station on Warrington St. Estimated cost, $40,000. Private plans.



THE WEEKLY PRICE GUIDE

IRON AND STEEL

PIG IRON—Quotations compiled by The Matthew Addy Co.:

	Current	One Year Ago
CINCINNATI		
No. 2 Southern	$32.00	$44.60
Northern Basic	29.50	42.80
Southern Ohio No. 2	32.00	43.80
NEW YORK—Tidewater Delivery		
2X Virginia (Silicon 2.25 to 2.75)	37.41	47.65
Southern No. 2 (Silicon 2.25 to 2.75)	37.76	47.70
BIRMINGHAM		
No. 2 Foundry	27.50	41.00
PHILADELPHIA		
Eastern Pa., No. 2x, 2.25–2.75 sil.	31.54*	45.35*
Virginia No. 2	35.14*	43.25*
Basic	29.00†	43.00†
Grey Forge	29.75*	42.50*
CHICAGO		
No. 2 Foundry local	30.00	43.25
No. 2 Foundry, Southern	34.16	46.60
PITTSBURGH, including freight charge from Valley		
No. 2 Foundry	29.96	43.65
Basic	26.96	42.90
Bessemer	28.96	43.40

* F.o.b. furnace. † Delivered

STEEL SHAPES—The following base prices per 100 lb. are for structural shapes 3 in. by ¼ in. and larger, and plates ¼ in. and heavier, from jobbers' warehouses at the cities named:

	New York			Cleveland		Chicago	
	*Current	One Month Ago	One Year Ago	Current	One Year Ago	Current	One Year Ago
Structural shapes	$3.58	$3.58	$3.97	$3.58	$5.50	$3.58	$3.47
Soft steel bars	3.48	3.45	4.12	3.34	5.00	3.48	3.52
Soft steel bar shapes	3.48	3.45	4.12	3.48		3.48	3.52
Soft steel bands	4.18	4.18	4.82	6.25	6.25		
Tank plates	3.78	3.78	4.17	3.78	5.00	3.78	4.67

*Add 10c. for trucking charge to Jersey City and 15c. to New York and Brooklyn from warehouse.

BAR IRON—Prices per 100 lb. at the places named are as follows:

	Current	One Year Ago
Mill, Pittsburgh	$2.25@$2.35	$4.00
Warehouse, New York	3.48	3.52
Warehouse, Cleveland	3.52	3.42
Warehouse, Chicago	4.12	3.52

SHEETS—Quotations are in cents per pound in various cities from warehouse; also the base quotations from mill:

	Pittsburgh, Large Mill Lots	New York *Current	New York One Year Ago	Cleveland	Chicago
Blue Annealed					
No. 10	3.55	4.90	6.80	4.00	4.68
No. 12	3.60	4.55	6.85	4.35	4.73
No. 14	3.65	4.60	6.90	4.40	4.78
No. 16	3.75	4.70	7.00	4.50	4.88
Black					
Nos. 18 and 20	4.20	5.30	7.30	4.95	5.55
Nos. 22 and 24	4.25	5.35	7.35	5.10	5.60
No. 26	4.30	5.40	7.90	5.15	5.65
No. 28	4.35	5.50	8.00	5.25	5.75
Galvanized					
No. 10	4.70	5.40	9.00	5.50	6.10
No. 12	4.80	5.50	9.10	5.60	6.20
No. 14	4.80	5.50	9.10	5.60	6.20
Nos. 18 and 20	5.10	5.90	9.40	5.90	6.50
Nos. 22 and 24	5.25	6.05	9.55	6.05	6.65
No. 26	5.40	6.20	9.70	6.20	6.80
No. 28	5.70	6.50	10.00	6.90	7.10

*To these prices 10c. must be added for delivery in Jersey City and 15c. for New York and Brooklyn.

COLD FINISHED STEEL—Warehouse base prices are as follows:

	New York	Chicago	Cleveland
Round shafting or screw stock, per 100 lb.	$5.50	$5.25	$4.84
Flats, square and hexagons, per 100 lb.	6.00	5.75	5.34

DRILL ROD—Discounts from list price are as follows at the places named:

	Per Cent
New York	50@55
Cleveland	50
Chicago	50

NICKEL AND MONEL METAL—Base prices in cents per pound any quantities, f.o.b. Bayonne, N. J.

Nickel	
Ingot and shot	43
Electrolytic	45

Monel Metal			
Shot and blocks	35	Hot rolled rods (base)	42
Ingots	38	Cold rolled rods (base)	56
Sheet bars	40	Hot rolled sheets (base)	55

Special Nickel and Alloys	
Malleable nickel ingots	45
Malleable nickel sheet bars	47
Hot rolled rods, Grades "A" and "C" (base)	60
Cold drawn rods, grades "A" and "C" (base)	72
Copper nickel ingots	42
Hot rolled copper nickel rods (base)	52
Manganese nickel hot rolled (base) rods, "D"—low manganese	64
Manganese nickel hot rolled (base) rods "D"—high manganese	67

ELECTRIC WELDING WIRE—Welding wire in 100-lb. lots sells as follows, f.o.b. New York: ⅛, 8½c. per lb.; ¼, 8c.; 5/32 to ½, 7½c. Domestic iron sells at 12c. per lb.

MISCELLANEOUS STEEL—The following quotations in cents per pound are from warehouse at the places named:

	New York Current	Cleveland Current	Chicago Current
Openhearth spring steel (heavy)	6.00	8.00	9.00
Spring steel (light)	8.00	7.00	12.00
Coppered bessemer rods	8.50	8.00	7.00
Hoop steel	4.58	4.04	4.18
Cold-rolled strip steel	9.00	8.25	9.25
Floor plates	5.75	4.00	6.03

WROUGHT PIPE—The following discounts are to jobbers for carload lots on the Pittsburgh basing card:

BUTT WELD

Steel			Iron		
Inches	Black	Galvanized	Inches	Black	Galvanized
⅛ to 3	57½%	44%	⅛	15½–16½%	+10½–11½%
			¼	19½–20½%	1½– 2½%
			⅜ to 1¼	24½–25½%	8½– 9½%

LAP WELD

2	50½%	38%	2	20½–21%	6½– 7%
2½ to 6	53½%	41%	2½ to 6	22½–23%	9½–10%
7 to 12	50½%	37%	7 to 12	19½–20%	6½– 7%
13 to 14	41%				
15	38½%				

BUTT WELD, EXTRA STRONG PLAIN ENDS

⅛ to 1¼	55½%	43%	⅛ to 1¼	24½–25½%	9½–10½%
2 to 3	56½%	44%			

LAP WELD, EXTRA STRONG, PLAIN ENDS

2	48½%	37%	2	21½–22½%	8½– 9%
2½ to 4	51½%	40%	2½ to 4	23½–24%	11½–12%
4½ to 6	50½%	39%	4½ to 6	22½–23%	10½–11%
7 to 8	46½%	33%	7 to 8	14½–15%	2½– 3%
9 to 12	41½%	28%	9 to 12	9½–10%	+2 –2½%

Warehouse discounts as follows:

	New York Black	New York Galv.	Cleveland Black	Cleveland Galv.	Chicago Black	Chicago Galv.
⅛ to 3 in. steel butt welded	44%	28%	42½%	33½%	57½%	44%
2½ to 6 in. steel lap welded	39%	24%	44½%	29½%	53½%	41%

Malleable fittings. Classes B and C, banded, from New York stock sell at plus 6%. Cast iron, standard sizes, 15% off.

METALS

MISCELLANEOUS METALS—Present and past New York jobbers' quotations in cents per pound, in quantities up to car lots:

	Current	Month Ago	Year Ago
Copper, electrolytic	13.50	14.00	19.00
Tin in 5-ton lots	29.25	32.00	64.00
Lead	4.50	5.50	7.50
Zinc	5.75	6.00	9.50
ST. LOUIS (In carload lots)			
Lead	4.10	5.25	8.67½
Zinc	5.35	6.00	8.50

At the places named, the following prices in cents per pound prevail, for 1 ton or more:

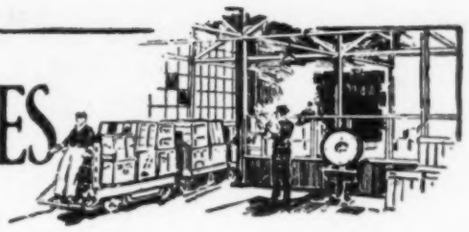
	New York Current	New York Month Ago	New York Year Ago	Cleveland Current	Cleveland Year Ago	Chicago Current	Chicago Year Ago
Copper sheets, base	20.75	21.00	29.50	22.50	31.00	24.25	36.00
Copper wire (carload lots)	15.75	16.00	29.25	19.00	29.50	24.00	27.00
Brass sheets	17.75	18.75	26.50	24.00	29.00	26.50	27.00
Brass pipe	21.50	23.50	32.00	24.00	34.00	21.50	35.00
Solder (half and half) (case lots)	19.63	22.50	39.00	26.00	40.50	21.00	38.00

Copper sheets quoted above hot rolled 24 oz., cold rolled 14 oz. and heavier add 2c.; polished takes 5c. per sq.ft. extra for 20-in. widths and under; over 20 in., 7½c.

BRASS RODS—The following quotations are for large lots, mill, 1,000 lb. and over, warehouse; net extra:

	Current	One Year Ago
New York	15.75	23.75
Cleveland	20.00	29.00
Chicago	21.25	26.00

SHOP MATERIALS AND SUPPLIES



ZINC SHEETS—The following prices in cents per pound are f.o.b. mill + less 8% for carload lots..... 11.50

	Warehouse			
	In Casks		Broken Lots	
	Current	One Year Ago	Current	One Year Ago
Cleveland	13.70	15.00	14.30	15.50
New York	12.50	14.00	13.50	14.50
Chicago	14.50	15.00	14.95	15.00

ANTIMONY—Chinese and Japanese brands in cents per pound, in ton lots for spot delivery, duty paid:

	Current	One Year Ago
New York	6.00	12.00
Chicago	6.50	12.50
Cleveland	7.50	13.00

OLD METALS—The following are the dealers' purchasing prices in cents per pound:

	New York			
	Current	One Year Ago	Cleveland	Chicago
Copper, heavy, and crucible	10.00	17.00	10.00	10.50
Copper, heavy, and wire	9.50	16.50	9.50	9.00
Copper, light, and bottoms	8.00	15.50	9.00	8.00
Lead, heavy	3.50	7.00	4.00	3.75
Lead, tea	2.2	8.25	3.00	3.00
Brass, heavy	6.50	12.00	7.00	10.00
Brass, light	5.00	8.50	5.00	5.50
No. 1 yellow brass turnings	5.50	14.00	5.50	6.00
Zinc	3.00	6.25	3.00	3.50

ALUMINUM—Cents per pound for spot:

	New York	Cleveland	Chicago
No. 1 aluminum, 98 to 99% pure, in ingots for remelting (1-15 ton lots), per lb.	28.2@28.1	24.50	33.50

COPPER BARS—From warehouse sell as follows in cents per pound, for ton lots and over:

	Current	One Year Ago
New York (round)	22.50	33.00
Chicago	24.50	29.00
Cleveland	22.00	32.00

BABBITT METAL—Warehouse price in cents per pound:

	New York		Cleveland		Chicago	
	Current	One Year Ago	Current	One Year Ago	Current	One Year Ago
Best grade	70.00	90.00	46.00	73.00	35.00	70.60
Commercial	30.00	50.00	16.50	21.50	9.00	15.00

NOTE—Price of babbitt metal is governed largely by formula, no two manufacturers quoting the same prices. For example, in New York, we quote the best two grades, although lower grades may be obtained at much lower prices.

SHOP SUPPLIES

NUTS—From warehouse at the places named, on fair-sized orders, the following amount is deducted from list:

	New York		Cleveland		Chicago	
	Current	One Year Ago	Current	One Year Ago	Current	One Year Ago
Hot pressed square	List	+$2.00	$1.00	$1.00	+1.15	1.25
Hot pressed hexagon	List	+2.00	1.00	1.00	+1.15	1.25
Cold punched hexagon	List	+2.00	1.00	1.00	+1.15	.90
Cold punched square	List	+2.00	1.00	1.00	+1.15	.90

Semi-finished nuts, ¼ and smaller, sell at the following discounts from list price:

	Current	One Year Ago
New York	60%	60%
Chicago	70%	50%
Cleveland	70%	55%

MACHINE BOLTS—Warehouse discounts in the following cities:

	New York	Cleveland	Chicago
All sizes up to 1 by 30 in.	45%	60%	50%
1¼ and 1½ in. by 3 in. up to 12 in.	25%	50%	45%

WASHERS—From warehouses at the places named the following amount is deducted from list price:

For wrought-iron washers:

New York.....$2.00 Cleveland.....$3.50 Chicago.....$2.50

For cast-iron washers, ⅜ and larger, the base price per 100 lb. is as follows:

New York.....$4.50 Cleveland.....$4.00 Chicago.....$4.50

CARRIAGE BOLTS—From warehouses at the places named the following discounts from list are in effect:

	New York	Cleveland	Chicago
⅜ by 6 in. and smaller	40%	50%	40%
Larger and longer up to 1 in. by 30 in.	40%	40%	40%

COPPER RIVETS AND BURS sell at the following rate from warehouse:

	Rivets		Burs	
	Current	One Year Ago	Current	One Year Ago
Cleveland	35%	20%	10%	30%
Chicago	net	10%	net	10%
New York	50%	10%	25%	10%

RIVETS—The following discounts are allowed for fair-sized orders from warehouse:

	New York	Cleveland	Chicago
Steel ⅞ and smaller	45%	50%	45%
Tinned	45%	50%	30%

Structural, ½ in. diameter by 2 to 5 in. sell as follows per 100 lb.:

New York...$5.08 Cleveland...$5.00 Chicago.....$5.08 Pittsburgh...$3.90

Boiler, same sizes:

New York...$5.30 Cleveland...$5.10 Chicago.....$5.18 Pittsburgh...$4.00

MISCELLANEOUS

SEAMLESS DRAWN TUBING—The base price in cents per pound from warehouse in 100-lb. lots is as follows:

	New York	Cleveland	Chicago
Copper	22.50	24.00	29.00
Brass	21.50	24.00	28.00

Prices vary with the quantity purchased. For lots of less than 100 lb., but not less than 75 lb., the advance is 1c.; for lots of less than 75 lb., but not less than 50 lb., 2½c. over base (100-lb. lots); less than 50 lb., but not less than 25 lb., 5c. should be added to base price; quantities less than 25 lb. add 10c. per lb.

Double above extras will be charged for angles, channels and sheet metal mouldings if ordered in above quantities. Above extras also apply to brass rod other than standard stock sizes—stock sizes being considered as ⅛-2 in. inclusive in rounds, and ⅛-1½ in., inclusive, in square and hexagon—all varying by thirty seconds up to 1 in. by sixteenths over 1 in. On shipments aggregating less than 100 lb., there is usually a boxing charge of $.75.

LONG TERNE PLATE—In Chicago No. 28 primes from stock sell, nominally, for $7.50 per 100 lb. In Cleveland—$8.50 per 100 lb.; New York price is 8c.

COTTON WASTE—The following prices are in cents per pound:

	New York		Cleveland	Chicago
	Current	One Year Ago		
White	7.50@13.00	13.00	13.00	14.25
Colored mixed	7.00@11.00	9.00–12.00	10.00	12.00

WIPING CLOTHS—Jobbers' price per 1,000 is as follows:

	13½x13½	13½x20½
Cleveland	#55.00	$65.00
Chicago	41.00	43.50

SAL SODA sells as follows per 100 lb.:

	Current	One Month Ago	One Year Ago
New York	$2.25	$2.00	$2.25
Philadelphia	2.00	2.75	2.00
Cleveland	3.25	4.00	2.50
Chicago	2.50	2.25	2.25

ROLL SULPHUR in 360-lb. bbl. sells as follows per 100 lb.:

	Current	One Month Ago	One Year Ago
New York (25 bbl.)	$2.50	$2.70	$3.40
Philadelphia (25 bbl.)	2.50	2.70	4.25
Chicago	4.50	4.50	5.00

COKE—The following are prices per net ton at ovens, Connellsville:

	Current	One Month Ago	One Year Ago
Prompt furnace	$5@$5.50	$5.00@$5.50	$6.00
Prompt foundry	6@6.50	6.50@7.00	7.00

FIRE CLAY—The following prices prevail:

		Current
Ottawa, bulk in carloads	Per Ton	$8.00
Cleveland	100-lb. bag	0.85

LINSEED OIL—These prices are per gallon:

	New York		Cleveland	Chicago	
	Current	One Year Ago	Current	Current	One Year Ago
Raw in barrels, (5 bbl. lots)	$0.73	$1.80	$0.90	$0.75	$1.00
5-gal. cans	0.76	2.00	1.15	0.90	2.23
1-gal. cans (2 to case)	0.76	.....	.....	.....	.....

WHITE AND RED LEAD—Base price per pound:

	Red				White	
	Current		One Year Ago		Current	One Year Ago
	Dry	In Oil	Dry	In Oil	Dry and In Oil	Dry and In Oil
100 lb. keg	13.00	14.50	15.50	17.00	13.00	13.00
25 and 50-lb. kegs	13.25	4.75	15.75	17.25	13.25	13.25
12½-lb. keg	13.50	5.00	16.00	17.50	13.50	13.50
5-lb. cans	16.00	17.50	18.50	20.00	16.00	15.00
1-lb. cans	18.00	19.50	20.50	22.00	18.00	16.00

500 lb. lots less 10% discount. 2,000 lb. lots less 10-4% discount. 10,000 lb. lots less 10-7½% discount.

R. I., Providence—C. E. Brissette, 685 North Main St., will soon award the contract for the construction of a 1 story garage on Duncan and North Main Sts. Estimated cost, $40,000. Private plans.

R. I., Providence—The Federal Truck Sale Co. of Rhode Island, 276 West Exchange St., will soon award the contract for the construction of a 1 story, 100 x 300 ft. garage and service station on Reservoir and Narragansett Aves. Estimated cost, $100,000. C. H. Lockwood, 171 Westminister St., Archt.

R. I., Providence—S. Wegler, Huntington Ave., plans to build a 1 story garage and service station. Estimated cost, $60,000. Private plans.

MIDDLE ATLANTIC STATES

N. Y., New York (Borough of Bronx)—J. J. Conway, c/o F. J. Shefeick, Archt. and Engr., 4168 Park Ave., will build a 2 story, 50 x 100 ft. addition to his garage on East 172d St. Estimated cost, $35,000.

N. Y., New York (Borough of Bronx)—I. L. Phillips, c/o Dunnigan & Crumley, Archts. and Engrs., 395 East 150th St., will build a 1 story, 85 x 300 ft. garage on Morris Ave. near 174th St. Estimated cost, $75,000.

Y., New York (Borough of Brooklyn)—The Dept. of Plants & Structures, Municipal Bldg., New York City, will soon award the contract for the construction of a housing station, machine and repair shop on Water and New Dock Sts. Estimated cost, $350,000.

N. Y., New York (Borough of Brooklyn)—M. Rich, 253 Throop Ave., will build a 1 story, 100 x 100 ft. garage on 1st Ave. Estimated cost, $65,000.

N. Y., New York (Borough of Manhattan)—J. J. Hearn, 15 West 96th St., will build a 1 story garage on Washington Ave. Estimated cost, $30,000.

N. Y., New York (Borough of Brooklyn)—H. Lindenbaum, 271 East 2d St., New York City, will build a 1 story, 100 x 100 ft. garage on Norman Ave. Estimated cost, $30,000.

N. Y., New York (Borough of Manhattan)—M. J. Martin Sons, c/o S. J. Kessler, Archt. and Engr., 529 Cortlandt Ave., Bronx, will build a 2 story, 110 x 125 ft. garage on 23d St. Estimated cost, $100,000.

Pa., Myerstown—The Myerstown Fdry. Mfg. Co. L. F. Krum, Pres.—new tools.

Pa., Philadelphia—The City Transit, 1211 Chestnut St., has awarded the contract for the construction of a 1 story inspection shop at Bridge St. Yard, for Frankford L. Cost to exceed $100,000. Noted Jan. 13.

MIDDLE WEST STATES

Ill., Chicago—The Amer. Insulated Wire & Cable Co., 954 West 21st St., is having preliminary plans prepared for the reconstruction of a 1 story, 196 x 200 ft. factory on 22d and Fick Sts. Estimated cost, $250,000. D. S. Klafter, 64 West Randolph St., Archt.

Ill., Chicago—The Chicago Blow Pipe Co., 216 North Sacramenta Bl. will soon award the contract for the construction of a 1 story, 75 x 75 ft. factory on West Lake and Clarkson Sts. Estimated cost, $30,000. Z. E. Smith, 305 East 55th St., Archt.

Ill., Chicago—J. D. and E. J. Duffy, 139 West Washington St., have awarded the contract for the construction of a 1 story, 90 x 120 ft. garage at 2906 North Clark St. Estimated cost, $55,000.

Ill., Chicago—The Floyd Mfg. Co., 522 South Clinton St., has awarded the contract for the construction of a 1 story, 35 x 60 ft. power house and a 2 story, 120 x 240 ft. factory for the manufacture of light tools, on Diversey St. and Harding Ave. Estimated cost, $175,000.

Ill., Chicago—The Parmelee Transfer Co., 105 West Adams St., has awarded the contract for the construction of a 1 story, 150 x 190 ft. garage on Monroe St. and Racine Ave. Estimated cost, $110,000.

Ind., Indianapolis—The Indiana Refrigerating Co., 232 South Pennsylvania St., will build a 2 story refrigerating plant. Estimated cost, $50,000.

Mich., Detroit—C. E. Konneker, 502 Moffat Bldg., is having plans prepared for the construction of a 3 story, 132 x 145 ft. automobile sales building, to include a service department, on Cass and Kolburn Aves. Private plans.

Mich., Detroit—The Michigan Stamping Co., 3171 Bellevue Ave., will soon award the contract for the construction of a 1 story, 60 x 480 ft. addition to its sheet metal working plant. A. Kahn, Marquette Bldg., Archt.

O., Cleveland—The Industrial Iron Wks. Co., 16025 Saranac Rd., is having plans prepared for the construction of a 1 story, 60 x 150 ft. factory and warehouse on Saranac Rd. Estimated cost, $50,000. O. Horn, Secy., Allen Osborn Co., Rose Bldg., Archts.

O., Cleveland—A. F. Regyner, 9523 Orleans Ave., has had plans prepared for the construction of a 1 story, 67 x 115 ft. garage on East 93d St. and Orleans Ave. Estimated cost, $50,000. A. E. Skeel, 4500 Euclid Ave., Archt.

O., Cleveland—The Sabin Machine Co., c/o H. B. Sabin Pres., 6536 Carnegie Ave., plans to build a 3 story, 50 x 80 ft. addition to its factory. Estimated cost, $40,000.

O., Columbus—The Ohio Highway Dept., South High St., is having sketches made for the construction of a 1 story, 213 x 460 ft. garage on West Broad St. Estimated cost, $75,000.

O., Youngstown — F. Leish, 224 East Boardman St., plans to build a 2 story, 70 x 140 ft. garage. Estimated cost, $200,000.

Wis., Evansville — Miller & Winn, East Main St., have awarded the contract for the construction of a 1 story, 60 x 130 ft. garage. Estimated cost, $45,000.

STATES WEST OF THE MISSISSIPPI

Kan., Lawrence—The Bd. Educ. is having plans prepared for the construction of a 2 story high school to include shop, etc. Estimated cost, $500,000. I. C. Stevenson, Supt. W. B. Ittner, 915 Locust St., St. Louis, Mo., Archt.

Mo., Joplin—The Joplin Steel & Malleable Co., East 3d St., will build a 1 story foundry and machine shop addition to its plant. Estimated cost, $8,000.

Mo., St. Louis — The Waycleanse Co. plans to build a plant for the manufacture of vacuum street cleaners. Estimated cost, $300,000. M. Smith, Pres.

CANADA

N. S., Trenton—The Nova Scotia Steel & Coal Co. will receive bids until March 15 for the construction of a machine shop, boiler house and forge.

Ont., Belleville—The Ontario School for the Deaf—$18,000 worth of shoe shop machinery and $2,500 worth of carpenter shop machinery.

Ont., Burwash—The Industrial Farm—$4,500 worth of machinery, etc, for workshops.

Ont., Kitchener—J. M. Schneider & Son, 63 Courtland Ave., E., will soon award the contract for the construction of a 1-story, 35 x 85 ft. garage. Estimated cost, $10,000. W. H. E. Schmalz, Frederick St., Archt.

Ont., London—E. Leonard & Sons, York St., have awarded the contract for the construction of a 2 story factory for the manufacture of steam engines and boilers. Estimated cost, $35,000.

Ont., Tilbury—The Gove Motor Car Co. will receive bids about April 1 for the construction of a 2 story, 85 x 200 ft. factory on Main St. Estimated cost, $100,000.

Ont., Toronto—G. Buschlen, R.R. No. 1, Parkway Ave., will soon award the contract for the construction of a 1 story, 40 x 90 ft. garage on Queen St. Estimated cost, $18,000.

Ont., Toronto.— The Temiskaming & Northern Ontario Ry. Comn., 56 Church St., plans to build shops and engine houses. Estimated cost, $78,800.

Ont., Welland—C. E. Nash has awarded the contract for the construction of a 2 story garage. Estimated cost, $18,000.

Que., Hull—W. Cross will receive bids until March 28 for the construction of a 50 x 75 ft. garage, on Chelsea Rd.

Que., Montreal—The Supercharge Engine Co. of Canada Ltd., 120 St. James St., will soon receive bids for the construction of a plant.

General Manufacturing

NEW ENGLAND STATES

Mass., Brookline (Boston P. O.) — The town has had plans prepared for the construction of a 1 story, 95 x 175 ft. addition to its manual training school on Tappen St. Estimated cost, $80,000. F. J. Untersee, 585 Boylston St., Boston, Archt.

Mass., Framingham—The Dennison Mfg. Co., 26 Franklin St., Boston, is having plans prepared for the construction of a 4 story, 70 x 100 ft. addition to its plant, here, for the manufacture of tags, etc. Monks & Johnson, 99 Chauncey St., Boston, Archts. and Engrs.

Mass., Natick—C. W. Dean & Co., North Main St., will soon award contract for the construction of a 3 story, 45 x 170 ft. factory for the manufacture of shoes. Estimated cost, $100,000. Private plans.

MIDDLE ATLANTIC STATES

Md., Baltimore—The Phelps Can Co., Lawrence St., has awarded the contract for the construction of a 1 story, 112 x 177 ft. factory. Estimated cost, $32,000.

SOUTHERN STATES

Ala., Birmingham—The Central Ice Co., 2214 Ave. A., plans to construct an ice storage plant. Estimated cost, $10,000.

La., Bastrop—The Bastrop Ice & Storage Co. plans to construct an ice plant. Estimated cost, $25,000. G. M. Boyd, Mgr.

N. C., Ashboro—C. C. Cranford plans to build a 2 story, 40 x 200 ft. chair factory to have a capacity of 1,000 chairs per day.

N. C., Kinston—H. C. Hines will build a 2 story, 30 x 105 ft. ice cream plant. Estimated cost, $50,000.

S. C., Columbia—C. C. Wilson, Archt., Palmetto Bldg., will receive bids until March 14 for the construction of a 2 story, 90 x 118 ft. printing plant on Sumter St., for the R. L. Bryan Co., 1425 Main St.

W. Va., Williamsport—W. H. Miller and G. Steffey plans to organize a company with $25,000 capital stock and establish an ice manufacturing plant.

MIDDLE WEST STATES

Ill., Chicago — The Friedman Kerr Co., 1407 West Jackson Blvd., will soon award the contract for remodeling a 4 story, 75 x 100 ft. store and loft building on Madison and Green Sts., into a candy factory. W. W. Ahlschlager, 65 East Huron St., Archt.

Wis., Antigo—The Langlade Laundry Co. plans to build a 2 story, 40 x 120 ft. laundry

Wis., Kenosha—The Blommer Ice Cream Co., 1502 North Ave., Milwaukee, is having plans prepared for the construction of a 1 story, 50 x 62 ft. ice cream factory and garage. Estimated cost, $30,000. C. H. Stehling Co., 401 4th St., Milwaukee, Archts. and Engrs.

Wis., Milwaukee — The Kuryer Polski Publishing Co., 435 Bway., is having plans prepared for the construction of a 3 story, 60 x 120 ft. newspaper plant on Wisconsin St. Estimated cost, $100,000. L. M. Gurda, 920 2d Ave., Archt.

See "SEARCHLIGHT" for Business Opportunities